INDIA RUBBER WORLD

MARCH, 1948

S O Smooth-Out

S O Smooth-Out

S O Smooth-Out

STERLING S O

S O Smooth-Out

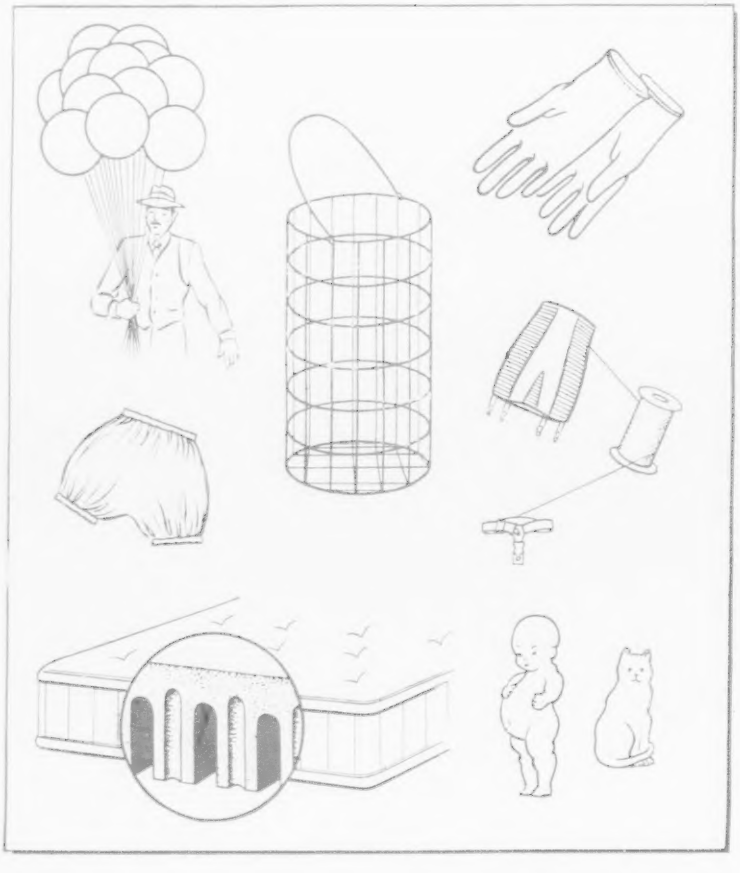
Smooth-Out Furnace Black for Tires — Tubes — Mechanical Goods — Footwear — Cable Jackets

GODFREY L. CABOT, INC. CABOT Boston 10, Mass.

AVAILABLE IN CARLOADS

ZENITE-TETRONE A

offers outstanding advantages as an accelerator combination in natural latex



FAST CURING

Tight cures may be obtained in 30 minutes at 212° F.—effective at 150° F. or higher.

GOOD AGING

Produces good aging latex films suitable for many applications, even without added antioxidant.

MINIMUM PRE-CURING

Storage periods up to 10 days at 80° F. are practical for most compounds.

NON-DISCOLORING

Does not add to the normal discoloration caused by rubber itself even upon exposure to sunlight.

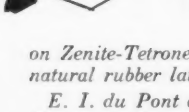
NON-STAINING

Under normal service conditions pyroxylin finishes, as well as most other finishes, are not stained by Zenite-Tetrone A acceleration.

STABLE

Does not adversely affect mechanical stability of compounded latex.

Tune in to Du Pont "Cavalcade of America," Monday Nights—8 p. m. EST, NBC



For more complete information . . .

on Zenite-Tetrone A acceleration for natural rubber latex, write to:

E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division, Wilmington 98, Delaware.

DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

India Rubber World, March, 1948, Vol. 117, No. 6. Published Monthly by Bill Brothers Publishing Corp., Office of Publication, Orange, Conn., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second-Class Matter at the Post Office at Orange, Conn., under the act of March 3, 1879. Subscription United States and Mexico, $3.00 per year; Canada, $4.00; All Other Countries, $5.00; Single Copies 35 cents. Address Mail to New York Office.

PUBLIC LIBRARY
MAR 24 1948
DETROIT

TWO NEW HYCAR AMERICAN RUBBERS

Hycar OR-25 EP *(Easy Processing)*
Hycar OR-25 NS *(Non-Staining)*

HERE are two new American rubbers, both with superior processing characteristics. Hycar NS and Hycar EP differ only in that a special anti-oxidant has been used in the NS, making it non-staining and non-discoloring. This is an outstanding quality, particularly desirable in the fabrication of light colored products. The new Hycar rubbers have all these advantages over the regular process Hycar OR-25:

1. They band on the processing mill speedily—cut mill mixing time.
2. Better extrusion characteristics—less nerve and less heat build-up.
3. Excellent high temperature mixing.
4. Better fusion and mold flow characteristics.
5. Increased building tack for laminated products, such as frictioned stocks and calendered sheeting.

Both rubbers retain those properties which make Hycar American rubbers so usable for so many products . . . permanent resiliency and superior resistance to oil, abrasion, and aging. Ask your supplier for parts made from Hycar. Or write to Dept. HA-3, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

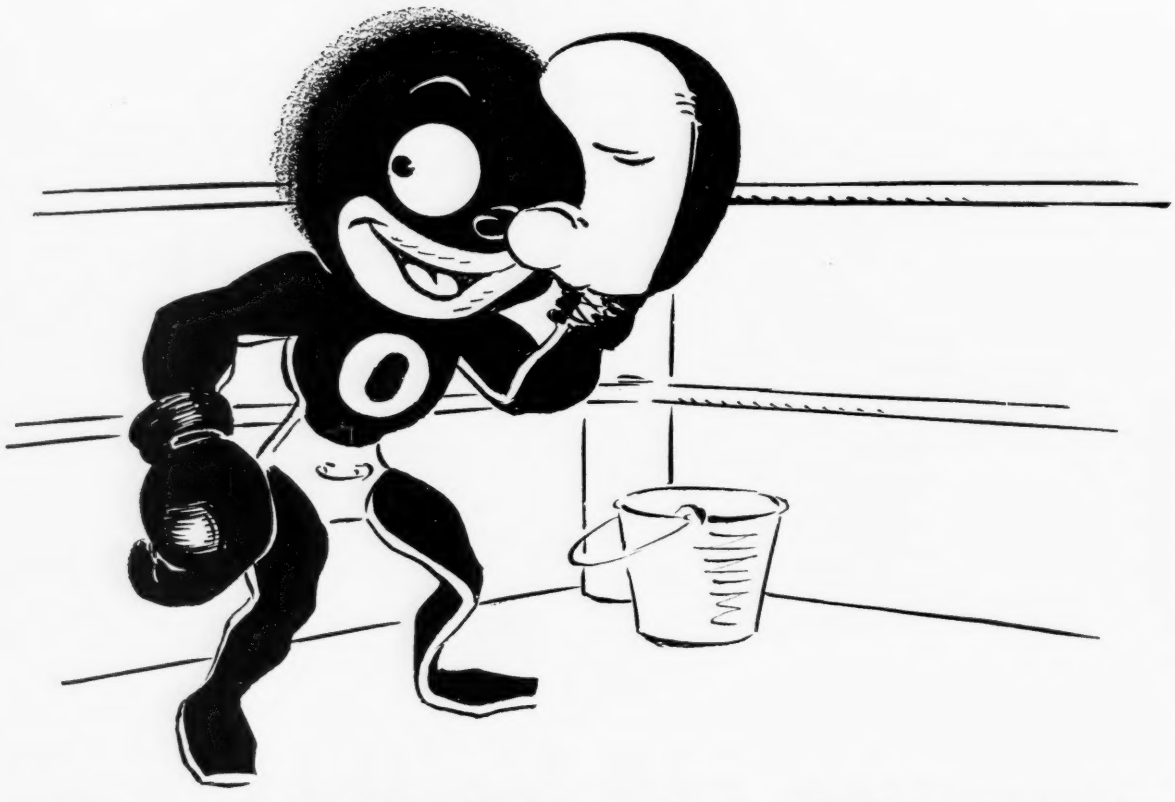
Hycar
Reg. U.S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

PHILBLACK O



CHALLENGES ALL COMERS!

We're betting on this new **HAF** (High Abrasion Furnace) black to win easily—against all challengers. Philblack O packs a wallop in either hand—superior abrasion resistance and extremely long flex-life. This aggressive one-two punch is backed up by a rugged defense against cut and crack growth, and resilience to stay in there and take it when the going's tough.

But you've got to see Philblack O in action to appreciate just how good he really is. Send for a trial order and give this "Black Wonder" a workout. Pit him against any other black in his class and see what splendid qualities Philblack O imparts to rubber products. High abrasion resistance, long flex-life, good resilience and, in addition, high tensile strength, even at elevated temperatures.

We think you'll find that Philblack O will win by a knock-out!

PHILLIPS PETROLEUM COMPANY

Rubber Chemicals Division

EVANS SAVINGS AND LOAN BUILDING · AKRON 8, OHIO

SIMPLE RUBBER MATHEMATICS!

x (MONEX — TETRAMETHYLTHIURAM MONOSULFIDE) + y (M-B-T — MERCAPTOBENZOTHIAZOLE)

EQUALS

SAFE, POWERFUL, ECONOMICAL, ACCELERATION FOR NATURAL RUBBER GR-S and GR-I

WHERE x EQUALS 0.1 IN NATURAL RUBBER
0.1 - 0.2 IN GR-S
1.0 - 1.25 IN GR-I
ON 100 PARTS R.H.C.

AND y EQUALS 1.0 - 1.5 IN NATURAL RUBBER
1.0 - 1.5 IN GR-S
0.5 IN GR-I
ON 100 PARTS R.H.C.

EQUALLY SIMPLE AND EFFECTIVE ARE MONEX + M-B-T-S (BENZOTHIAZYL DISULPHIDE) OR O-X-A-F (ZINC SALT OF MERCAPTOBENZOTHIAZOLE)

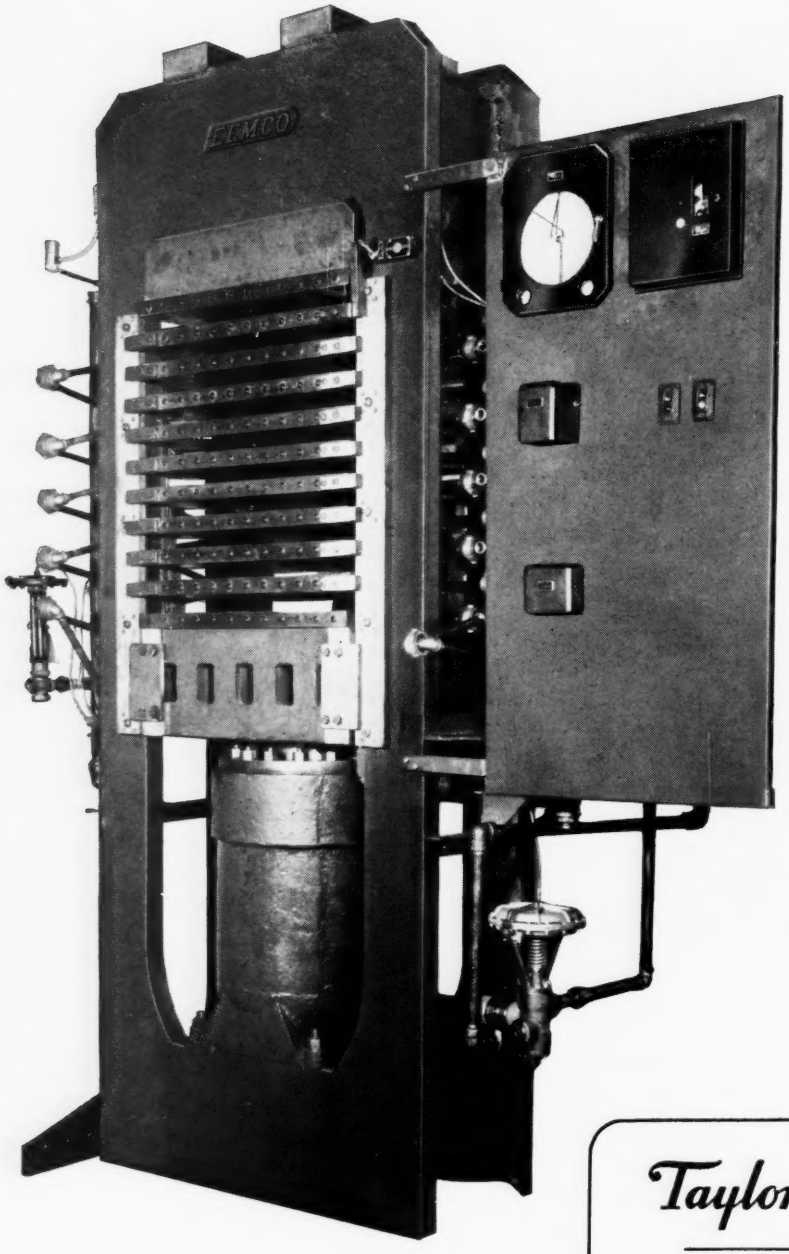
MONEX · M-B-T · M-B-T-S and O-X-A-F are NAUGATUCK ACCELERATORS

Process — Accelerate — Protect with NAUGATUCK CHEMICALS

Write for a New Bulletin—
"MONEX AS AN ACTIVATOR FOR THIAZOLES"

NAUGATUCK CHEMICAL
Division of United States Rubber Company
1230 AVENUE OF THE AMERICAS • NEW YORK 20, N. Y.
IN CANADA: *Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ont.*

HOW AUTOMATIC CONTROL SAVES 9 STEPS IN PLATEN PRESS MOLDING



HERE you see a new "EEMCO" heavy-duty hydraulic press, built by the Erie Engine and Mfg. Company at Erie, Pa. Those Taylor Instruments on the panel attached to it are there to save you these *nine vital operating steps!* Here's what happens:

1. Fulscope Controller (upper left) records and controls outlet press temperature by throttling steam inlet valve.

2. Repeating Cycle Timer (left center) operates condensate discharge valve periodically and automatically.

And then the **Flex-O-Timer** automatically handles these seven steps:

1. Closes press.
2. Supplies air to Fulscope which then turns steam on. Also supplies air to Repeating Cycle Timer.
3. Cooling water is off and discharge valve is in position to close water to drain and open condensate return.
4. Master Timer stops and cuts in Auxiliary Timer to time the cure.
5. At end of cure, Auxiliary Timer stops, Master Timer restarts, air is shut off to Temperature Controller and Repeating Cycle Timer, shutting off steam supply. Master Timer also repositions three-way valve in outlet to close condensate return and open water-to-drain connection. Also turns on cooling water.
6. At end of cooling, Flex-O-Timer turns off water, reverses position of three-way valve in outlet, ready for next cycle.
7. Press opens and Flex-O-Timer stops.

TOTAL: 9 steps—**the whole curing process**—controlled automatically without a single chance of human error! Another rea why we say, "When ordering processing equipment, specify Taylor equipped as usual." Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

Good-rite
VULTROL
for use in American rubber compounding
to prevent scorching, and for recovering
scorched stocks
GOOD-RITE AND VULTROL REG. T M U S PAT OFF

For technical data please write Dept. CA-3

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

ROSE BUILDING, CLEVELAND 15, OHIO

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

• PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX •

PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX • GASTEX • PELLETEX • GASTEX •

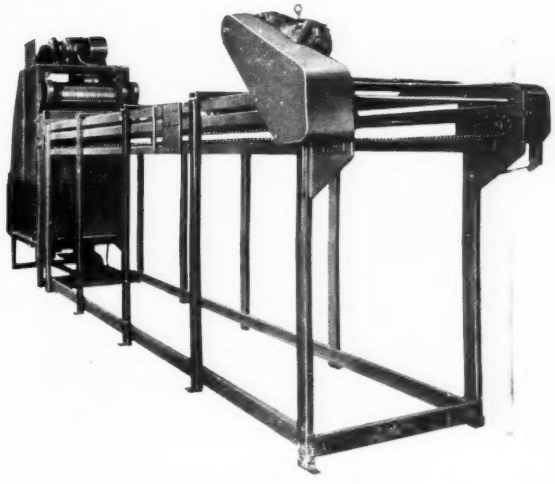
Cut your Banbury Cycle Time...

with this

AKRON-STANDARD AUTOMATIC MILL BATCH-OFF MACHINE

MILL END. The Akron-Standard automatic batch-off machine ready to receive milled stock.

Designed primarily to handle the mill output in connection with Banbury dump mills, this proven Akron-Standard machine distinctly shortens your Banbury cycle. It saves valuable mixing time by removing a continuous slab of stock from the mill in two minutes or less — *in a mere fraction of the time* you have heretofore needed to slab off the processed stock by hand. Your processing cycle is much reduced, your stock-handling definitely speeded up. How can you possibly afford to be without this remarkable time-saving Akron-Standard equipment?



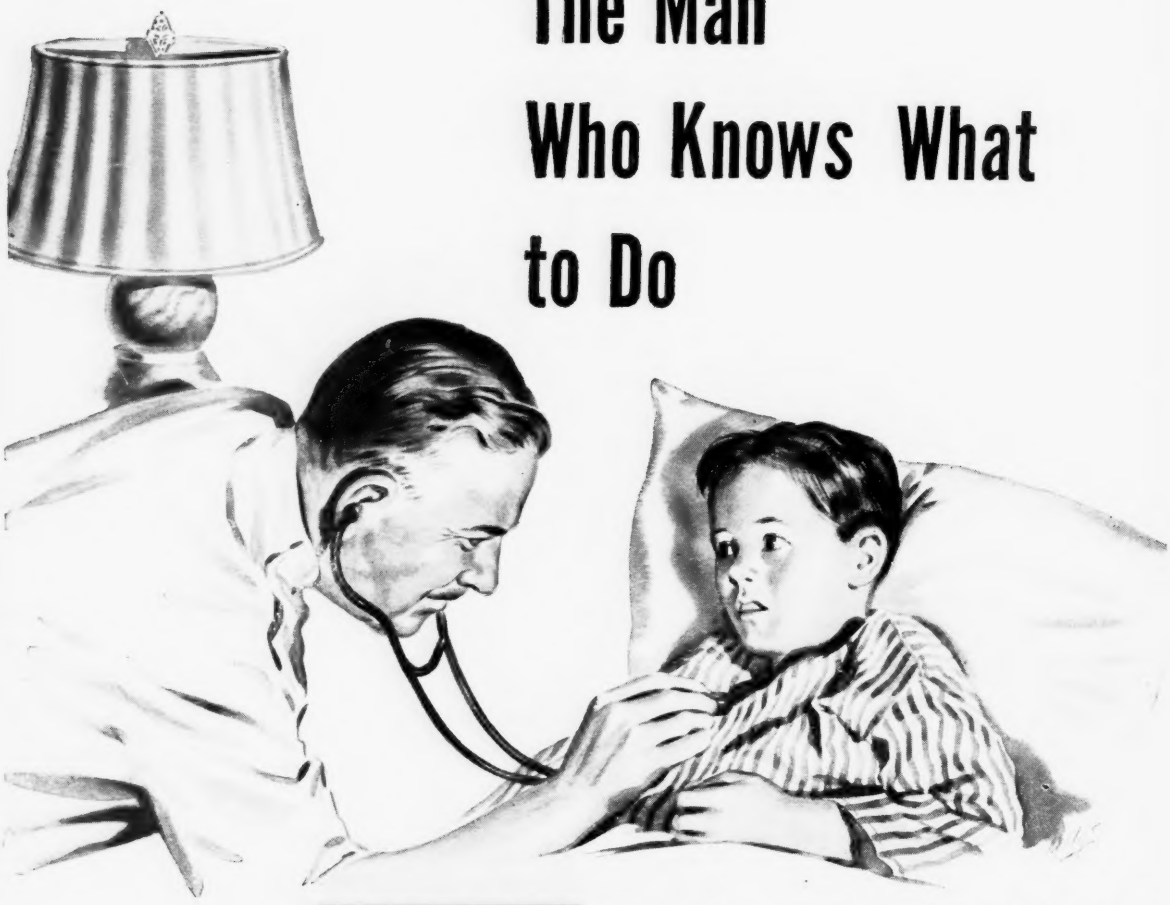
BATCH-OFF END. Rack-loading end and festoon rack in position to receive milled slab.

Ask for our well illustrated 36-page Bulletin "W", describing this and many other types of profit-making Akron-Standard equipment.

The Akron Standard Mold Co.

1624 Englewood Avenue *"The Established Measure of Value"* Akron 5, Ohio, U. S. A.

The Man Who Knows What to Do



"DOC" MacGEE SAYS: When illness strikes, you call in the doctor, the man who *knows* what to do for treatment. When you have legal problems, you seek the advice of the lawyer, the man who *knows* how to solve them.

When special problems relating to industrial solvents come up, it's comforting to know there's another man available who *knows* what to do. He's the skilled, trained SKELLYSOLVE Technical Fieldman — a real *specialist* in solvent problems.

His services, skills, and knowledge are at the beck and call of every plant using industrial solvents. He typifies Skelly's willingness to render more-than-ordinary service. He offers assistance that's always available *on call* . . . whether in sudden emergencies or merely when you desire the counsel of a man who thoroughly knows solvent problems and applications.

You may never require the services of a SKELLYSOLVE Technical Fieldman. But there's reassurance in the knowledge that his assistance is always available. His function is just as important in the SKELLYSOLVE organization as the purity, uniformity, close boiling ranges, and *dependability of supply* of SKELLYSOLVE itself.

Plan now to have a talk with the man who *knows* solvents — a SKELLYSOLVE Technical Fieldman. He represents a company that *knows* how to serve you with dependable, high-quality solvents—Skelly Oil Company. Write us today.

SKELLY

Skellysolve

SOLVENTS DIVISION, SKELLY OIL COMPANY, KANSAS CITY, MO.

UNITED CARBON COMPANY, INC.

CHARLESTON 27, W. VA.

NEW YORK • AKRON • CHICAGO

DIXIE 40 HMF and KOSMOS 40 HMF have these desirable characteristics—cool mixing, easy processing, smooth and rapid extrusion, fast rate of cure, full reinforcement, low heat build-up, high resiliency and high resistance to cut-growth, flex cracking and abrasion. DIXIE 40 and KOSMOS 40 are furnace type reinforcing carbon blacks, produced by a special process under carefully controlled conditions, especially useful for tires of all types, tubes, footwear and mechanical goods.

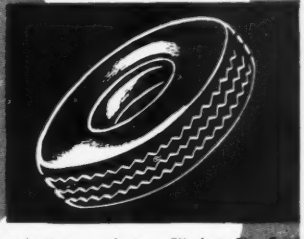
RESEARCH DIVISION

UNITED CARBON COMPANY, INC.

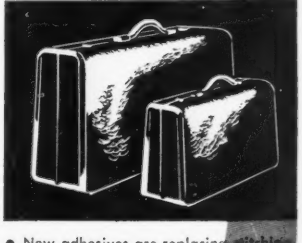
Charleston 27, West Virginia

Fountain of USE!

● Flintkote Sizerants are widely used for fabric sizing, and in the Rug and Carpet industry to improve wear and appearance of the finished product.



● In tire manufacture, Flintkote Tire Cord Solutioning for rayon and cotton tire cord insures a firm, durable bond of rubber to carcass... so important to tire life.



● New adhesives are replacing stitching, riveting and other old methods of fastening in many industries. Many luggage makers save time and money by assembling with Flintkote Industrial Adhesives.

● Flintkote Binder Compounds are helping many fabricators speed up their production. Among the uses of such compounds are curled hair (above) and glass fiber.

● Out of Flintkote research flows new *utility* for elastomers. With it, come advantages in performance and *use* to manufacturers and processors.

Flintkote has applied research to many compounding problems. And, as a result, offers a wide line of rubbers, resins, latex compounds and asphalts, both as aqueous dispersions and solvent cements.

These materials...designed for standard or special requirements...are supplied either by drum or tank-car.

If some saturating, laminating or bonding requirement is giving you trouble, let us help. Our technical staff will be glad to work right along with you to formulate just what you need. Write us today.

FLINTKOTE

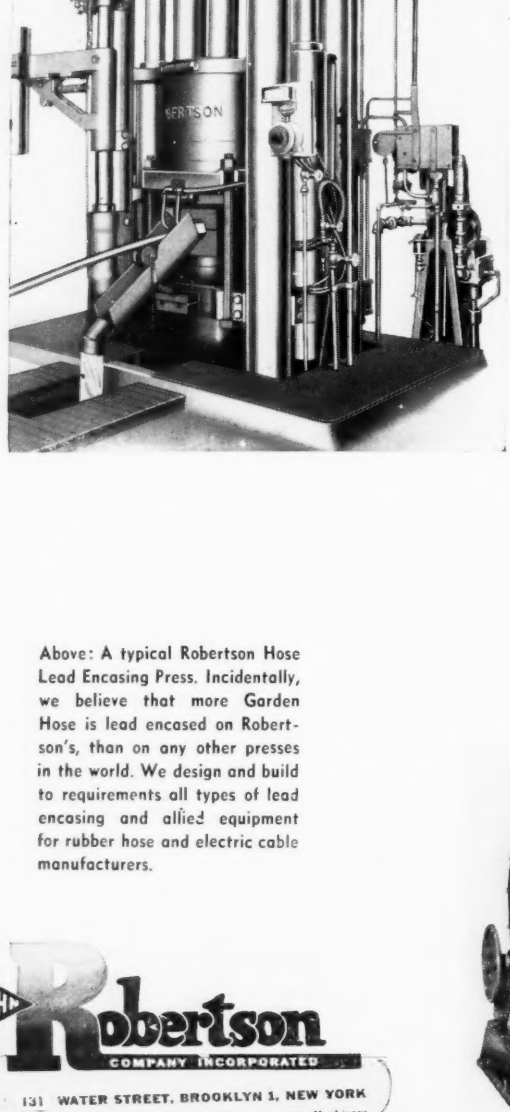
Products for Industry

FLINTKOTE INDUSTRIAL PRODUCTS

THE FLINTKOTE COMPANY, *Industrial Products Division*

30 Rockefeller Plaza, New York 20, N. Y. • Atlanta • Boston • Chicago Heights

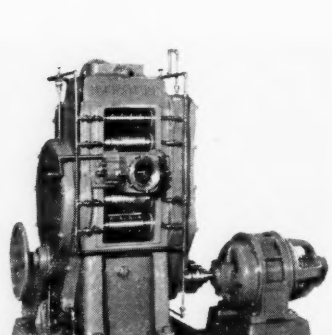
"CUSTOM-BUILT" FOR YOUR JOB



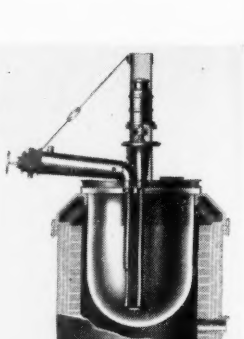
All Robertson equipment, like the hose lead encasing press shown here, is made by men constantly mindful of the ultimate application of that equipment. It is this "custom-built" quality that increases efficiency and produces a better product for leading manufacturers of hose and cable.

Over four generations of *specialized experience* in the manufacture of high-pressure hydraulic machinery *only,* coupled with consistent engineering advancement and painstaking craftsmanship, make possible the saying, "if it's a Robertson, it's right."

Above: A typical Robertson Hose Lead Encasing Press. Incidentally, we believe that more Garden Hose is lead encased on Robertson's, than on any other presses in the world. We design and build to requirements all types of lead encasing and allied equipment for rubber hose and electric cable manufacturers.



Lead Sheath Stripping Machine



Open Lead Melting Pot

JOHN Robertson COMPANY INCORPORATED

131 WATER STREET, BROOKLYN 1, NEW YORK

Designers and Builders of all Types of Lead Encasing Machinery

Since 1858

DU PONT ANNOUNCES

LUDOX®

COLLOIDAL SILICA for LATEX

To increase bond strength, modulus and wear

NOW—Du Pont "Ludox," a new form of silica, broadens the usefulness of latex products.

As a colorless modifying agent . . . added to latex . . . it strengthens neoprene and other elastomers.

For Latex Adhesives

"Ludox" strengthens—as much as two to threefold—latex adhesion to wide variety of surfaces . . . including fabric to fabric, leather to leather, and latex to metal. It also increases the bonding versatility of many aqueous adhesive and film-forming compositions . . . and even gives superior bonds where there is no adhesion with silica-free latex compositions.

For Latex Films and Coatings

"Ludox" improves wear by decreasing abrasion up to 50% . . . and reducing water absorption and swelling of neoprene. Outstanding increases in modulus of neoprene-dipped goods can also be expected.

What is "LUDOX"?

"Ludox" contains silica of relatively high purity that is finely subdivided and chemically reactive. It is an aqueous colloidal solution, highly fluid, and substantially free of alkali. The particle size is less than 1/1,000,000 of an inch.

An 18% solution is now available in commercial quantities, and a 30% solution will be available in the near future.

Can you use "LUDOX"?

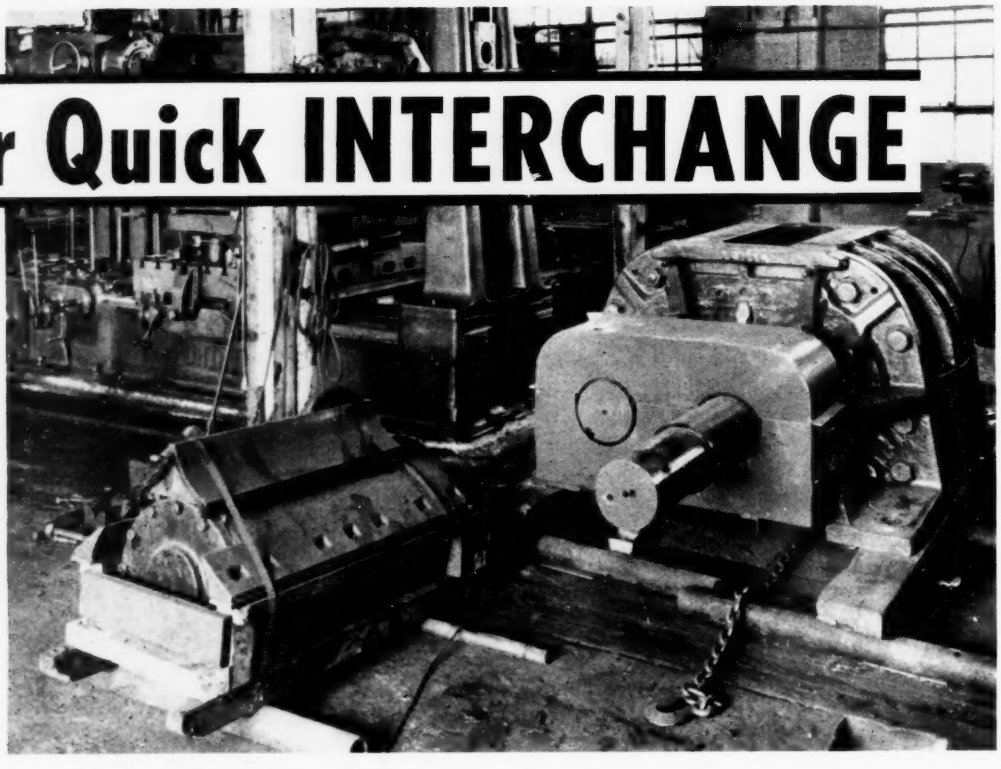
To determine if "Ludox" can solve any of your problems, write or wire Du Pont today. A technical representative will be glad to discuss your problem, and explain the use of this new Du Pont development.

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Dept.
Wilmington 98, Delaware

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

For Quick INTERCHANGE



COMPLETELY
REBUILT #9 BANBURY BODIES

If you have a worn #9 Banbury that needs rebuilding—WE CAN SHIP—QUICK—a replacement body—COMPLETELY REBUILT, and in tip-top condition. Just let us know which type, spray or jacketed. We will also send an experienced man to supervise installation. Your worn Banbury body is then sent to us.

We have many spare parts . . . for all sizes of Banburys.

We rebuild *all sizes* of Banburys but are in position to give this extra fast service on the #9. It reduces to the minimum any loss of production time in your mixing room.

Interstate Rebuilding includes our own exclusive hard-surfacing process, and our own specially fabricated and guaranteed rings, made to standard dimensions.

Call or write us and we will tell you how long it will take, and exactly how much it will cost. You will save trouble, time, and money.

SERVING THE IWS RUBBER INDUSTRY

INTERSTATE WELDING SERVICE

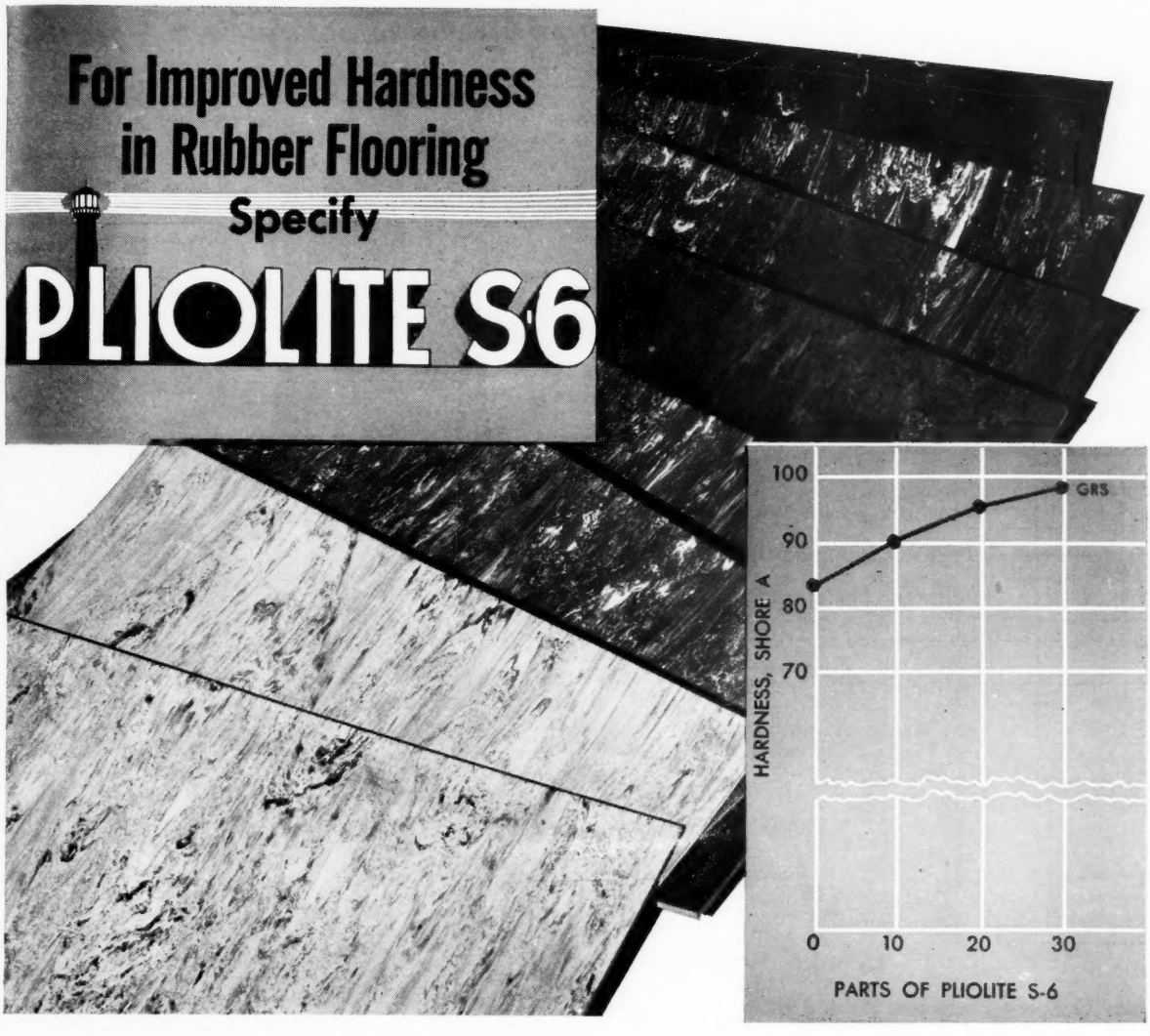
Main Plant: 914 Miami Street AKRON 11, OHIO Phone: JE 7970

EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

For Improved Hardness in Rubber Flooring

Specify

PLIOLITE S-6



RUBBER flooring must be hard and scuff- and abrasive-resistant to withstand long years of abusive service. The chart above shows how effectively loaded GRS stocks are hardened by reinforcement with **PLIOLITE S-6.**

Experience proves that when **PLIOLITE S-6** and mineral fillers are used in combination, very high hardness values can be obtained in stocks that still retain excellent toughness and durability.

Another important advantage of **PLIOLITE S-6** is the fact that it helps to eliminate scrap. It acts as a plasticizer at elevated temperatures, improving calendering and plate polishing. As the stock cools, **PLIOLITE S-6** prevents shrinkage.

You will find **PLIOLITE S-6** well suited to all compounds needing a light-color, low-gravity stock of 70-100 durometer hardness with good processing characteristics and moldability. It is highly desirable as a substitute for carbon black, since it reinforces natural and synthetic rubbers in colored as well as black stocks.

PLIOLITE S-6 is available as a powder for your own mixing, or in master batches in whatever synthetic you select. For complete information and sample, write: Goodyear, Chemical Products Division, Plastics and Coatings Dept., Akron 16, Ohio.

GOODYEAR

1898 GOODYEAR 50 YEARS 1948

Pliolite—T.M. The Goodyear Tire & Rubber Company

TITANOX ... *the brightest name in titanium pigments*

Add

"White Magic"

to your products

When a rubber product, such as a bathing suit, is made with TITANOX pigments, it's sure to have lasting whiteness and brightness. Not only are these qualities imparted in great measure by these versatile titanium dioxide pigments, but also maximum opacity is contributed to rubber products of all kinds.

Although the makers of TITANOX are pushing production to full capacity to meet the growing demand for these pigments, the supply still is not great enough to fill all orders. However, we may be able to help you get the most out of your available supply. Our Technical Service Laboratory — reached through our nearest office — will be glad to help you.

6313

TITANOX

Reg. U. S. Pat. Off.

TITANIUM PIGMENT CORPORATION
SOLE SALES AGENT

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Industry is on the Move .... Westward

UNION PACIFIC RAILROAD COMPANY
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G. F. ASHBY, PRESIDENT

To American Industry:

The Union Pacific West offers industry proximity to products of ranch, mine and forest...ample power, fuel, water...healthful living conditions in scenic, recreational regions...and native-born, high-type labor.

Our faith in the future of this vast territory is confirmed by our current 200-million-dollar investment program for new equipment, improved and expanded facilities to provide shippers and travelers with the utmost in rail transportation.

We are at your service.

Yours very truly,

G F Ashby

President,
Union Pacific Railroad

George F. Ashby

* One of a series of advertisements based on industrial opportunities in the states served by Union Pacific Railroad.

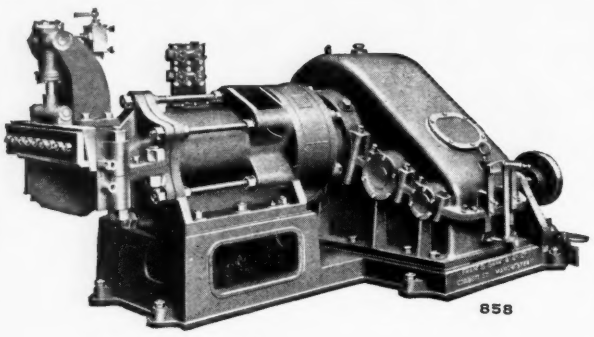
Unite with Union Pacific in selecting sites and seeking new markets in California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Utah, Washington, Wyoming.

*Address Industrial Department, Union Pacific Railroad
Omaha 2, Nebraska

UNION PACIFIC RAILROAD

Road of the Daily Streamliners

SHAW RUBBER EXTRUDERS

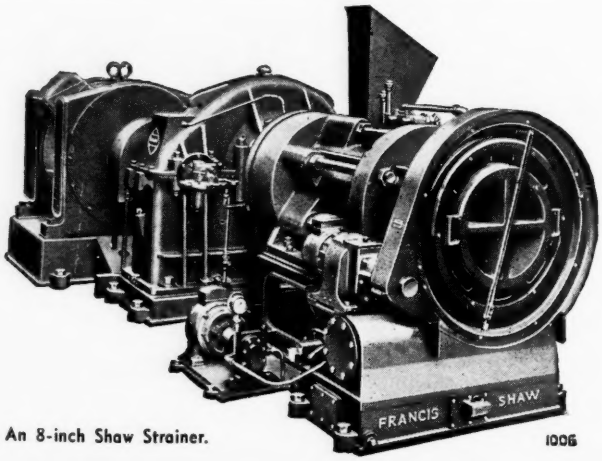


An 8-inch Shaw Extruder
for Tyre Tread Production

We have been making all types of extruders for the rubber industry since 1879

Your enquiries will receive the benefit of over 65 years experience in the design and manufacture of sound machines.

WE CAN EQUIP COMPLETE TYRE PLANTS AND GENERAL RUBBER PROCESSING FACTORIES WITH MACHINERY PRODUCED ON MODERN PLANT BY SKILLED WORKMEN AND TECHNICIANS.



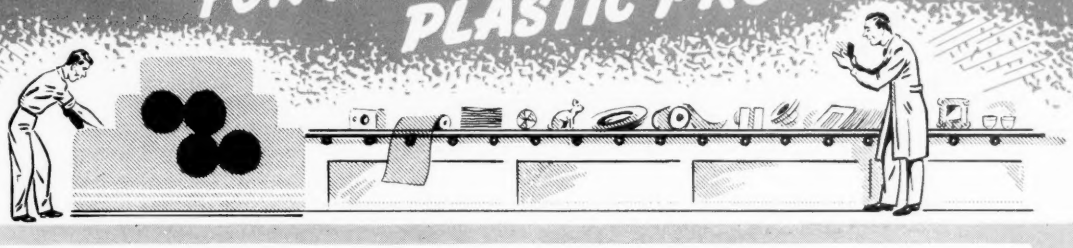
An 8-inch Shaw Strainer. 1006

FRANCIS SHAW & CO. LTD. MANCHESTER 11 ENGLAND

R-138

STANTONE Masterbatch Colors...

FOR ALL RUBBER and PLASTIC PRODUCTS!



★*Complete* **Range of Colors...**

★*Uniform* **Color Intensity...**

STANTONE MASTERBATCH means concentrated color dispersed in a quickly compatible thermoplastic medium—always standardized in color intensity—always uniform . . . With STANTONE MASTERBATCH COLORS you save costly experimentation, so often necessary with dry pigments due to natural variations in color intensity . . . STANTONE MASTERBATCH COLORS make color compounding mathematically accurate when matching correct color specifications . . . Mills may be changed from one color batch to another without intermediate cleaning. Many manufacturers today are adopting STANTONE MASTERBATCH COLORS for better coloring, greater compounding efficiency and economy.

★

A complete range of colors are now available in MASTERBATCH or dry pigment form, also Pulp Colors for Latex . . .

Write for complete data on color compounding with STANTONE COLORS — for Rubber and Plastics.

HARWICK STANDARD CHEMICAL CO.

AKRON 8, OHIO

Branches: Boston . . . Trenton . . . Chicago . . . Los Angeles

ANNOUNCING A CAPACITY RATINGS

**Makes possible the use of smaller bearings—
with savings in bearing cost, material cost and weight
—and more compact product design**

IN the ten years since the present load capacity ratings of Timken tapered roller bearings were established, Timken bearings have been steadily improved. Improved so much that today the load carrying capacity of Timken bearings is a good *25% greater* than it was 10 years ago!

As a result, The Timken Roller Bearing Company is now able to announce a 25% increase in the load capacity ratings of all Timken bearings —following a careful review of laboratory studies on fatigue life machines over the past ten years, together with close observation of bearing performance in the field.

Permits Use of Smaller Bearings

Now you can safely carry your present bearing loads on smaller size Timken bearings. Reductions in size of shafts and housings are possible. Products can be made more compact—lighter in weight. You have an opportunity to save both on bearing costs and material costs. And this increase in ratings should enable engineers to utilize the advantages of Timken bearings in an even broader variety of applications than has been practicable in the past.

Result of Constant Quality Improvement

This 25% increase in Timken bearing capacity ratings is based on continued improvement in the quality of Timken tapered roller bearings over the past 10 years. It is due to a number of factors, including improved alloy steels made in our own Timken steel mill specifically for anti-friction bearings, better metallurgical control in the processing of this steel, more accurate manufacturing equipment, greatly improved surface finishes, and more accurate inspection methods. That these improvements in Timken bearing quality have resulted in 25% greater load capacity has been conclusively demonstrated by years of exhaustive laboratory and field studies!

New Engineering Journal to Give Facts

A new Timken Engineering Journal is now in

25% INCREASE IN LOADS OF TIMKEN® BEARINGS

The result of years of constant improvement in Timken bearing quality—supported by exhaustive laboratory studies and extensive field experience

preparation which will give complete capacity rating tabulations and will also include new bearings introduced since the last publication. Pending publication of the new Journal you may take full advantage of the 25% capacity increase by multiplying the existing ratings by 1.25.

For further assistance in the application of Timken bearings, call upon our field engineers or our Engineering Department.

Timken tapered roller bearings take any combination of radial and thrust loads, hold shafts in rigid alignment, assure precision and minimize friction. The 25% increase in load capacity ratings is the *latest* example of Timken leadership in serving the bearing needs of all industry . . . one more reason why it pays to look for the trade-mark "Timken" on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ⟶◫⟵ LOADS OR ANY COMBINATION ✳

Calco
REG. U. S. PAT. OFF.

RETARDER PD*

RETARDER PD is a non-toxic, fine white powder with a specific gravity of approximately 1.50.

RETARDER PD gives good retarding or anti-scorch effects at processing temperatures and very little or no retarding effect at curing temperatures. It is practically *non-discoloring* so that it may be used in white and light colored stocks.

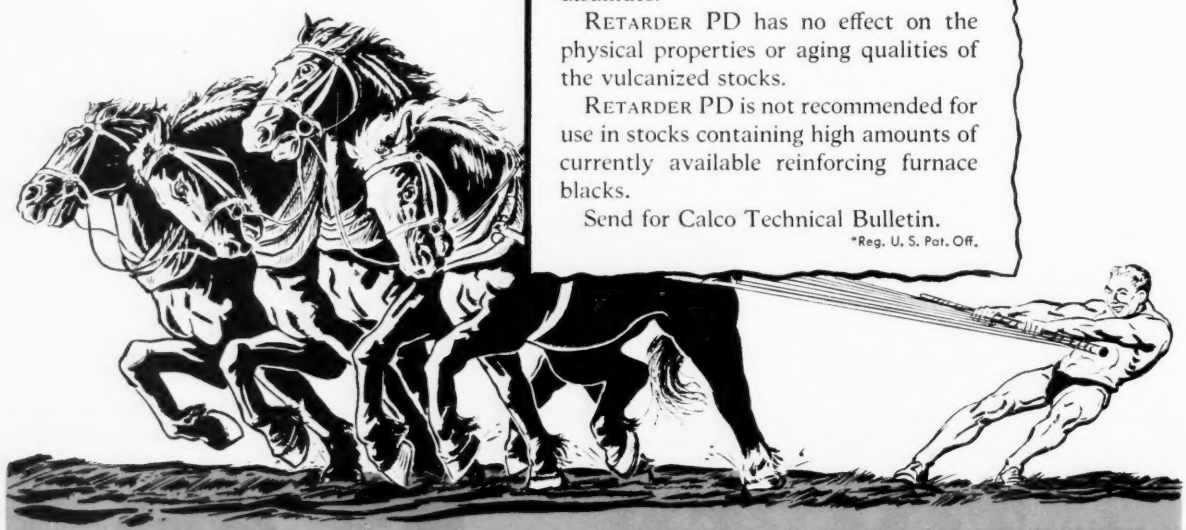
RETARDER PD is very effective with the thiazole type of accelerators or with combinations of the thiazole accelerators and guanidine accelerators or thiuram disulfides.

RETARDER PD has no effect on the physical properties or aging qualities of the vulcanized stocks.

RETARDER PD is not recommended for use in stocks containing high amounts of currently available reinforcing furnace blacks.

Send for Calco Technical Bulletin.

*Reg. U. S. Pat. Off.



Calco

RUBBER CHEMICALS DEPARTMENT
CALCO CHEMICAL DIVISION
AMERICAN CYANAMID COMPANY
BOUND BROOK • NEW JERSEY

SALES REPRESENTATIVES AND WAREHOUSE STOCKS: Akron Chemical Company, Akron, Ohio • Ernest Jacoby & Company, Boston, Mass. • Herron & Meyer of Chicago, Chicago, Ill. • H. M. Royal, Inc., Los Angeles, Calif. • H. M. Royal, Inc., Trenton, N. J. In Canada: St. Lawrence Chemical Company, Ltd., Montreal and Toronto.

★ *A smooth, stable,* DUSTLESS *dispersion of* ZINC STEARATE *in water in concentrated form*

AQUAZINC

NO DUST . . . HEALTH INSURANCE FOR YOUR PERSONNEL

ATTENTION, manufacturers of milled stock, rubber compounds, molded goods, coated fabric and paper, Butyl rubber, latex and cements. Aquazinc is economical and efficient to use. It can be applied with uniformity and with no loss. It eliminates dust, inconvenience, fire hazard, and other difficulties accompanying the use of powdered Zinc Stearate.

AQUAZINC is particularly convenient for surface application of Zinc Stearate. When diluted with 8 to 20 parts of water, it can be applied by spray or bath.

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PURITY · UNIFORMITY · DEPENDABILITY
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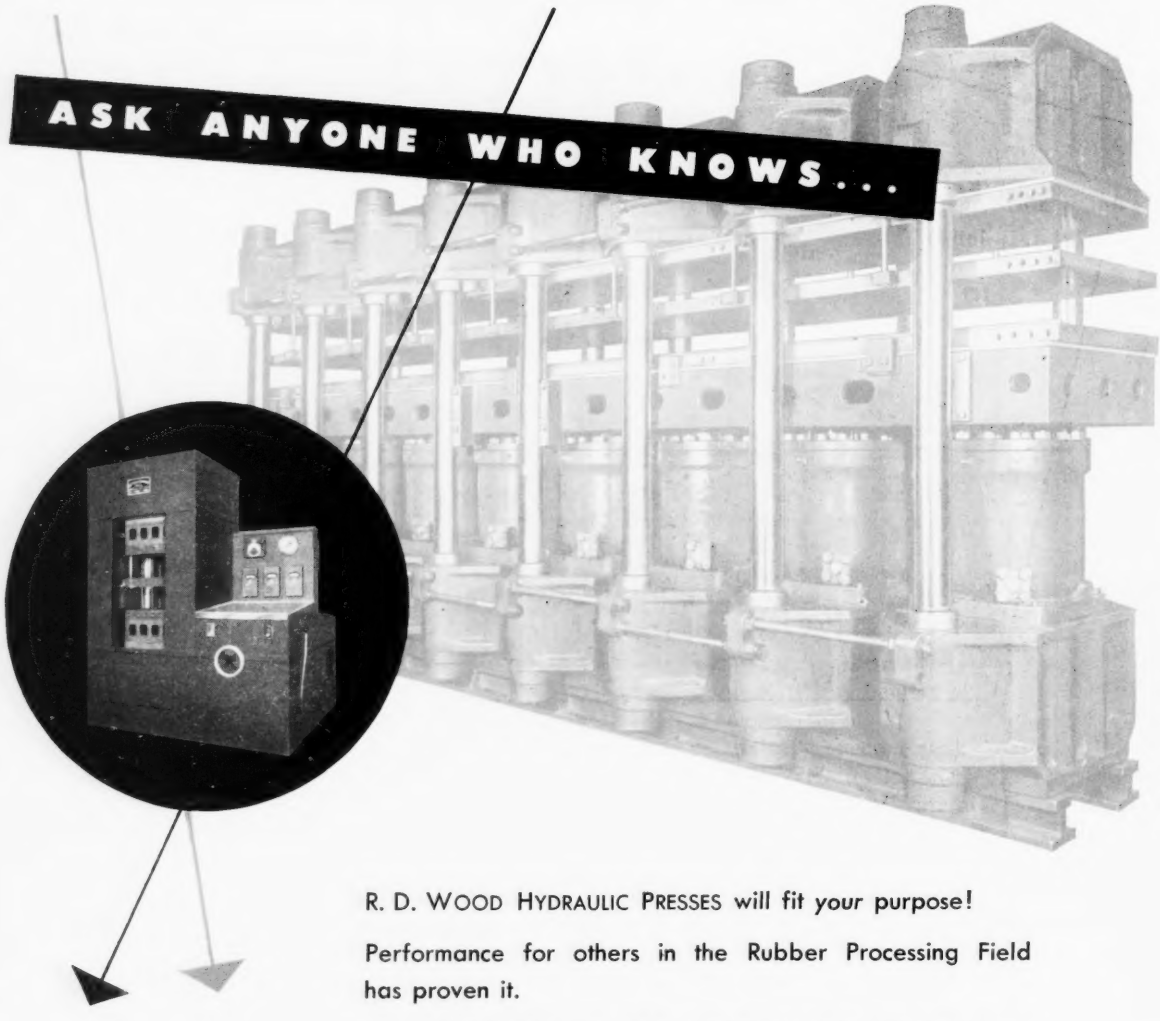
ASK ANYONE WHO KNOWS...



R. D. WOOD HYDRAULIC PRESSES will fit *your* purpose!

Performance for others in the Rubber Processing Field has proven it.

To know the features of R. D. Wood Hydraulic Presses is knowledge enough to have their operation and integral quality perform economically for you. For in any R. D. Wood Press there is rugged construction, ease of operation, and low maintenance, all wrapped in top quality.

R. D. Wood Presses *do* excel in actual performance . . . from the small laboratory press to the large vulcanizing and curing press . . . they have shown their worth to the Rubber Industry by constant, efficient, economical service.

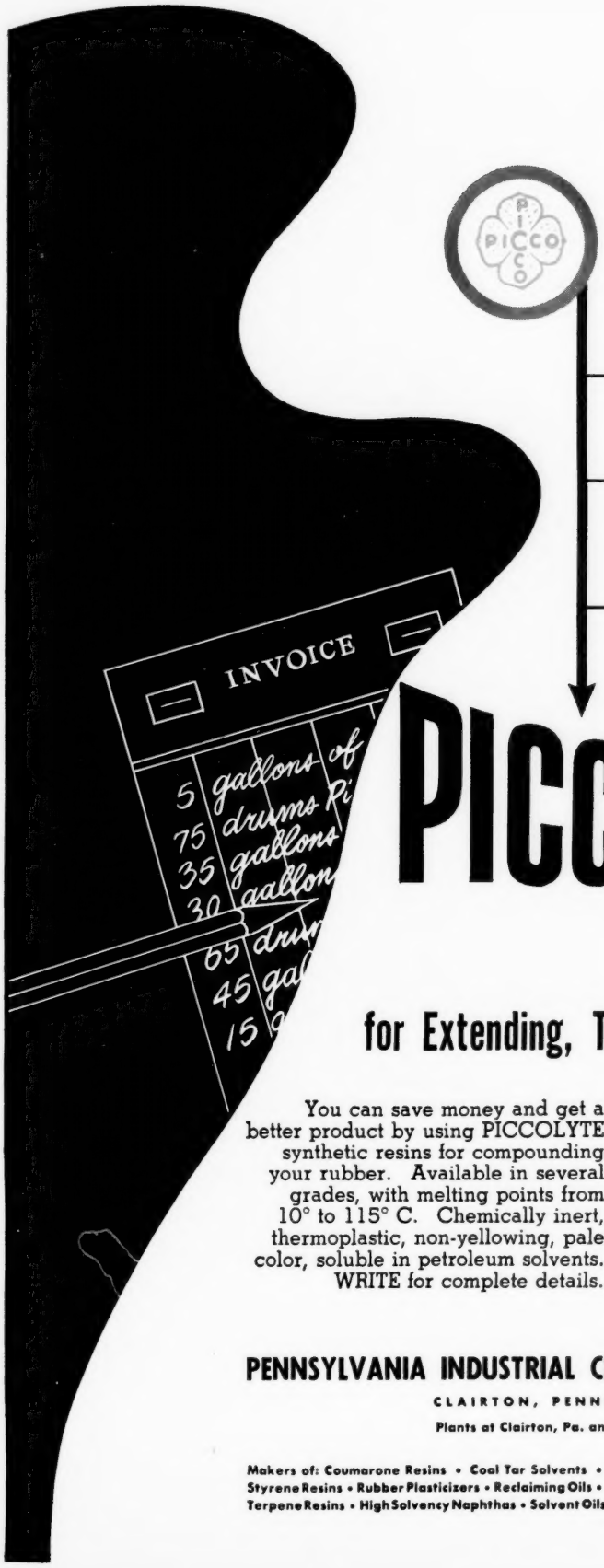
Now, available to you is technical information . . . ask for it and be in on the "know" about the line of R. D. Wood Presses.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE • ACCUMULATORS • ALLEVIATORS • INTENSIFIERS

EST. 1803

R.D. Wood Company

PUBLIC LEDGER BUILDING, PHILADELPHIA 5, PA.



Use

Low-cost

dependable

PICCOlyte

the versatile resin

for Extending, Tackifying, Cementing

You can save money and get a better product by using PICCOLYTE synthetic resins for compounding your rubber. Available in several grades, with melting points from 10° to 115° C. Chemically inert, thermoplastic, non-yellowing, pale color, soluble in petroleum solvents. WRITE for complete details.

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CLAIRTON, PENNSYLVANIA

Plants at Clairton, Pa. and Chester, Pa.

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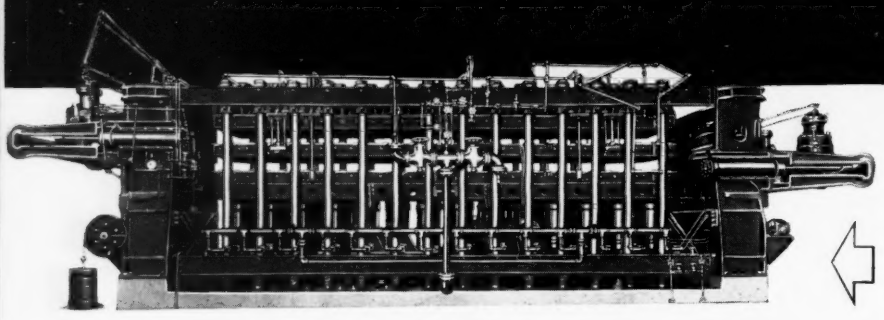
ADAMSON UNITED HYDRAULIC PRESSES

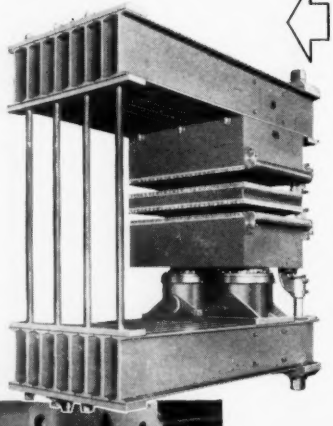


TWO-OPENING

This press has two openings permitting two lengths of belting up to 60 inches in width running in opposite directions, to be cured simultaneously. It is equipped with polished platens 63 inches wide by 31 feet long. Twenty-eight rams provide pressure during the curing operation. Proper belt tension is maintained by

FLOOR COVERING PRESS

A three-opening 42" x 126" Rod-type Press with three 22" hydraulic rams. The head, platens and bolsters are continuous the full length of the press. Just the press for your floor tile and runners. Flooring may be cured in molds, or between flat, sandwich plates. A prime characteristic of this press is its versatility. Addition of stretchers makes it adaptable to belt curing, or, cut apart, it becomes three separate 42" square presses.



OPEN-SIDE BELT PRESS

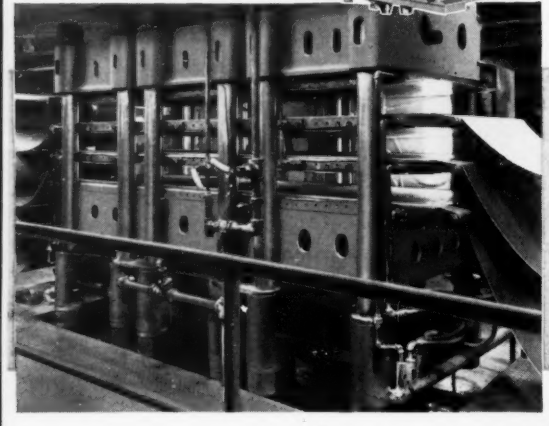
Through the use of structural beams for the head and base, with strain rods, this heavy-duty unit is desirable for the larger, more powerful open-side presses. Cold ends are built into 50" x 42" platens. The intermediate platens are held horizontal by four heavy guides traveling on turned and ground strain rods. The press is powered by two 20" rams. Excellent for curing "V" and flat belts.

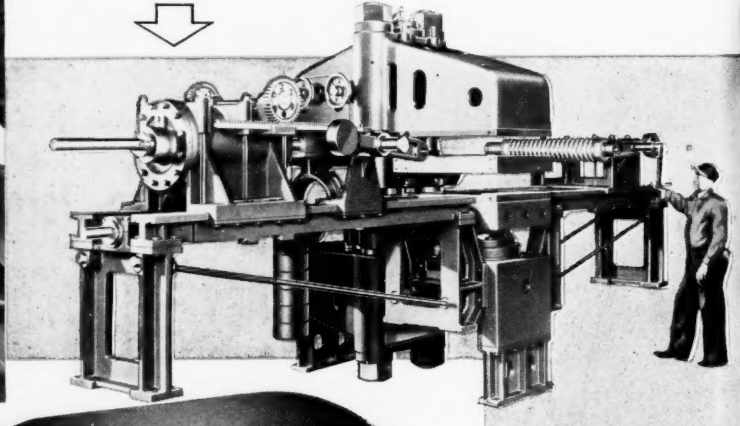
One of the most important uses of the Press is the curing of endless belts. Endless belts can be put into and taken out of the Press very easily.

30" x 36" OPEN-SIDE BELT CURING PRESS FOR FLAT OR V-BELTS

Complete with adjustable hydraulic stretcher, this press was designed and built for one of the industry's largest belt manufacturers. All platens are equipped with built-in cold ends. Intermediate platen with counter-weights, is accurately suspended and guided on ground strain rods. Overhead push-back is provided for intermediate platens and bolster. Platens are chromium plated for flat belt curing.

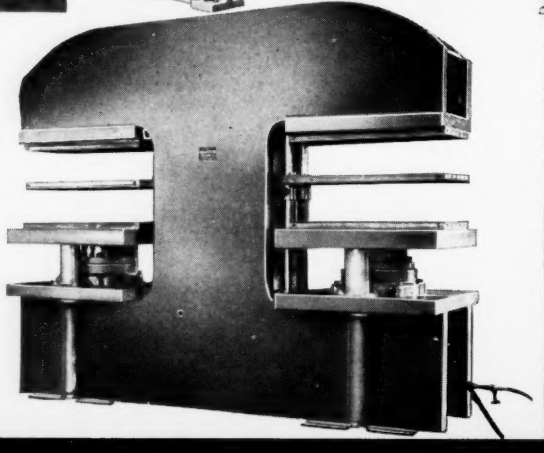
Stretcher rolls are made up of steel cores and shells of aluminum grooved to the proper contour for the belts involved. Aluminum roller shells are interchangeable.





DUPLEX PRESS FOR CURING "V" TRANSMISSION BELTS

The flat belts cured on this type of press are used in all kinds of agricultural machinery and wherever flat pulleys must be driven. It is a rugged, easily accessible, economical press with fabricated steel plate housing. It is equipped with spring-loaded pull-backs for the bolster. Intermediate platen is suspended in a manner that assures operator perfect parallelism of top and bottom platens. This press is indicated where pressures are comparatively low, and is ideal for curing "V" belts, etc. Manually or hydraulically operated belt stretcher equipment is available.



ADAMSON UNITED PRODUCTS

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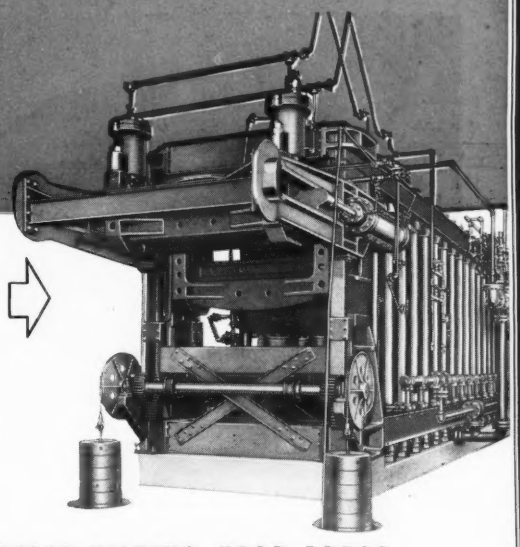
FOR ENDLESS FLAT BELTS AND ENDLESS V-BELTS

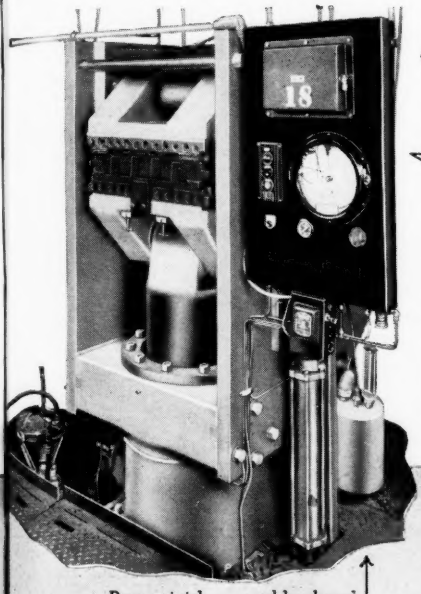
Our latest catalog of Hydraulic Presses for the Rubber, Plastics and Plywood industries, is ready for distribution. It describes and illustrates many types of Presses not shown in this advertisement. Send for it. You'll find it interesting.



BELT CURING PRESS

means of a clamp at one end and a stretcher at the other. These are mounted on separate stands rigidly braced by heavy compression members which extend the full length of the press. The clamp holds the belt while the stretcher is hydraulically pushed away from the press to give the belt the required stretch.

An exclusive Adamson United feature is the means of raising and lowering the stretcher clamps to maintain exact alignment of the press platen surface with the adjustment clamp surfaces. This mechanical method, much superior to hydraulic synchronization, causes the clamps and stretchers to move in perfect unison with the platen, eliminating entirely the possibility of the belt bending over the edges of the platen ends during the curing process. Press can be built with one or two openings in any size, for any platen pressure.



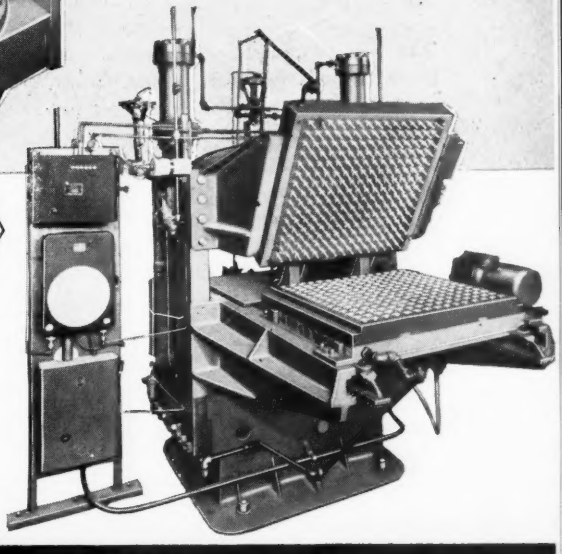
ALL HYDRAULIC TILTING-HEAD PRESS

Note the accessibility of this press compared with outmoded conventional types. It is simple and rugged, with 24" x 24" platens fastened to a tilting head and a tilting bolster. The platens remain parallel during the first part of the down stroke of the ram, then tilt open during the remainder of the down stroke. Unlike the Automatic Press, the molds never emerge from the Press. Toggles for opening and closing the molds have been eliminated.

The right amount of pressure per square inch on the platens is maintained hydraulically. Wear or variable platen pressures are eliminated.

Ram raised . . . molds closed

Molds in loading position



SINGLE OPENING AUTOMATIC PRESS

Fully automatic, yet possessing all the advantages of the conventional press for precision molding, this new type automatic, in many instances, has stepped up production as much as 50%.

Operation is extremely simple, with practically all manual effort eliminated. There is no more tugging or handling of heavy molds in and out of the Press. The operator has only to remove the cured articles and replace them with uncured rubber, press a button and the molds recede into the Press and close. A time cycle device opens the Press at the end of the cure and the molds open and move out of the Press and stop in a tilted position, from which the operator can easily strip the cured articles and repeat the process.

Single or double opening Presses can be furnished in this style, to take molds from 32" x 32" to 42" x 42".

Branch Offices Located at:
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ADAMSON UNITED COMPANY

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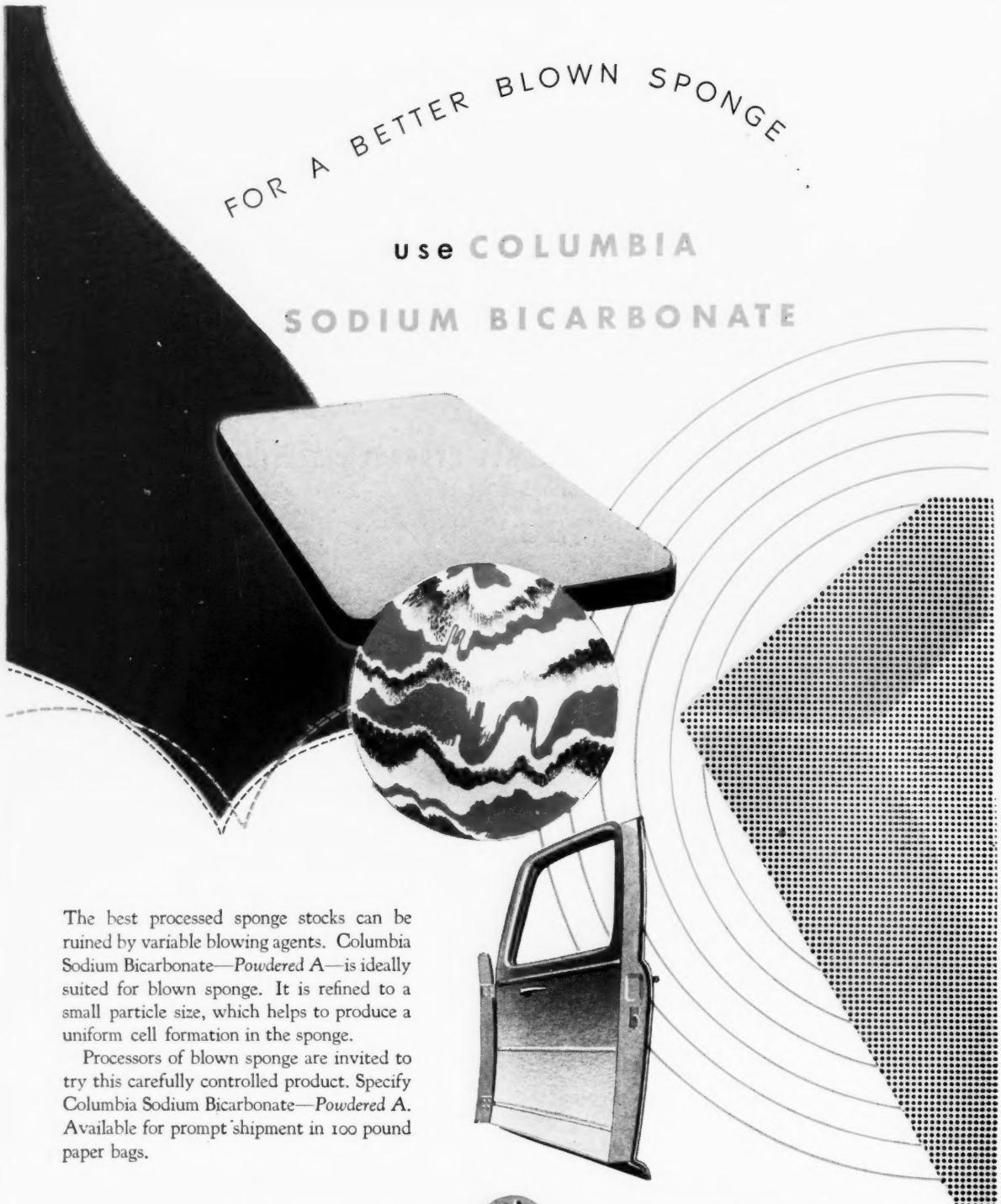

The best processed sponge stocks can be ruined by variable blowing agents. Columbia Sodium Bicarbonate—*Powdered A*—is ideally suited for blown sponge. It is refined to a small particle size, which helps to produce a uniform cell formation in the sponge.

Processors of blown sponge are invited to try this carefully controlled product. Specify Columbia Sodium Bicarbonate—*Powdered A*. Available for prompt shipment in 100 pound paper bags.

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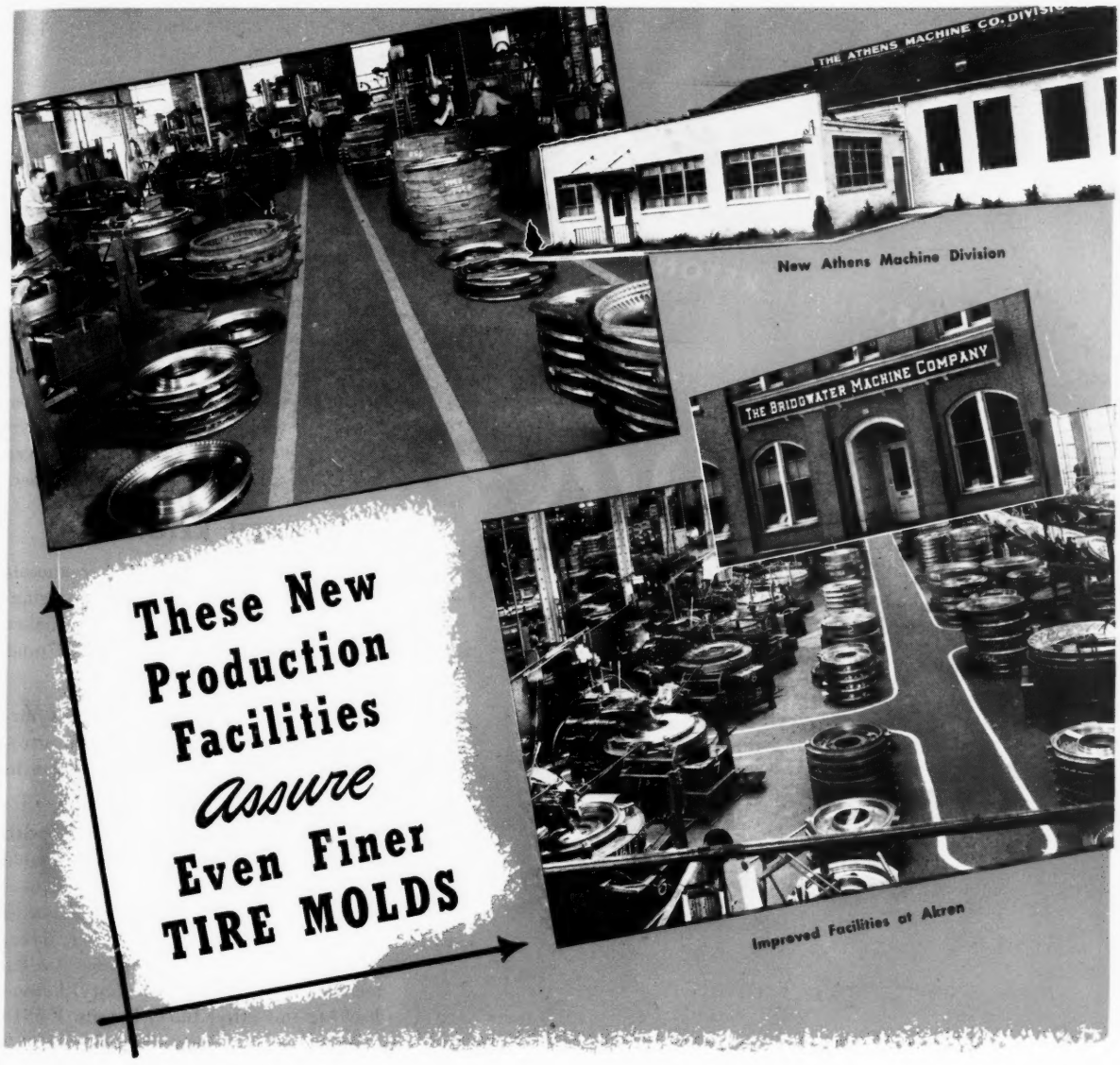
PITTSBURGH PLATE GLASS COMPANY


THE ATHENS MACHINE CO. DIVISION
New Athens Machine Division
THE BRIDGWATER MACHINE COMPANY
Improved Facilities at Akron

These New Production Facilities *assure* Even Finer TIRE MOLDS

ACCURACY, precision, and finish are characteristic of tire molds made by BRIDGWATER. The ability to follow every minute design detail, the accurate template fit to all characters and ribs in the design, the sharp corners, and highly polished surfaces mean tire molds unsurpassed anywhere in the world.

To keep abreast of the growing demand for BRIDGWATER molds, our new plant—The Athens Machine Division — was built exclusively for tire mold manufacture—the first of its kind, we believe, in the history of tire making.

The new Athens Machine Division, plus enlarged facilities at our Akron plant, is assurance of fast production, at the lowest possible cost.

THE BRIDGWATER MACHINE COMPANY

Akron, Ohio

FOR BETTER MOLDS FOR BETTER TIRES *SPECIFY* BRIDGWATER

DIISOBUTYL KETONE

Ketones

ETHYL BUTYL KETONE

Available in commercial quantities

—to give you formulating freedom

in the manufacture of lacquers and

synthetic resin coatings.

FORMULA	Diisobutyl Ketone $C_4H_9COC_4H_9$	Ethyl Butyl Ketone $C_4H_9COC_2H_5$
Boiling Point at 760 mm. Hg	168.1°C.	147.8°C.
Toluene Dilution Ratio at 20°C.	1.5	2.6
½ sec. R.S. Nitrocellulose Viscosity, 18°C. "Vinylite" resin VYHH Solution	Gel Structure	112 cps
Evaporation Time (Butyl Acetate = 8 hr.)	44 hr.	14 hr.
Weight per gal. at 20°C.	6.73 lb.	6.8 lb.
Specific Gravity at 20/20°C.	0.3089	0.3197

DIISOBUTYL KETONE

Dispersant—Best all around resin dispersant available for making organosols based on VINYLITE resin VYNV. Makes possible semi-hard and hard metal coatings containing little or no plasticizer, and aids in the preparation of highly plasticized coatings for cloth and paper.

Solvent—Retards premature evaporation in brushing lacquers, and reduces blushing in air-dried lacquers. Gives better flow-out and gloss to baked finishes.

ETHYL BUTYL KETONE

Dispersant—Produces fluid organosols having good viscosity stability on aging. Permits high solids content and makes good, clear films without checking ("mud cracking").

Solvent—Good solvent in both air-dried and baked finishes based on nitrocellulose or vinyl resins. Less active in lifting undercoats.

Intermediates—When condensed with amines and other chemical groups capable of reacting with the carbonyl group, these ketones give compounds of interest as inhibitors, rubber accelerators, dyes, pharmaceuticals, and insecticides. Ask for technical literature on diisobutyl ketone F-6934, and ethyl butyl ketone F-6918 —when writing please address Dept. M-3.

The word "Vinylite" is a registered trade-mark of Carbide and Carbon Chemicals Corporation.

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Unit of Union Carbide and Carbon Corporation

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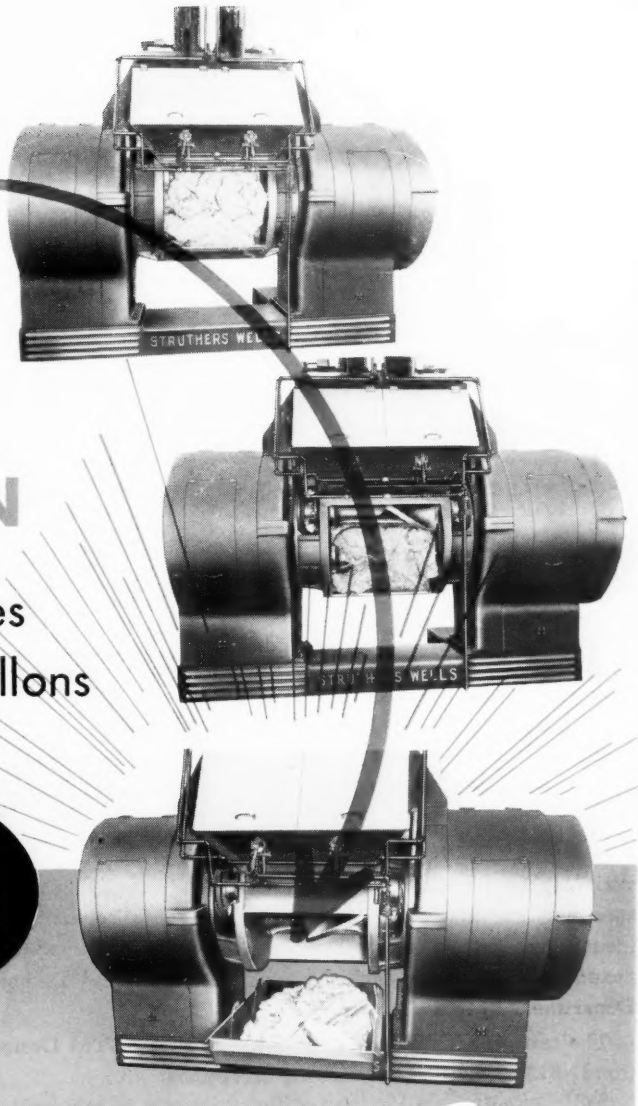
Carbide and Carbon Chemicals, Limited, Toronto

FAST...

EASY, DUMPING ACTION

with working capacities from 1 pint to 275 gallons



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INTENSIVE MIXERS

for Dependable, Economical Processing of

PLASTICS · NATURAL and SYNTHETIC RUBBER · ASPHALT COMPOSITIONS · RECLAIMED RUBBER · LINOLEUM and FLOOR TILE COMPOSITIONS

STRUTHERS WELLS CORPORATION

NORTHMASTER DIVISION

Plants at Warren, Pa. and Titusville, Pa.

Offices in Principal Cities

Technical Bulletin No. 42 — on the Compounding of GR-S with Substantial Loadings of ZINC OXIDE

Cut-Growth or Crack-Growth ASTM Designation D-813-44T

Equipment for carrying out the test at elevated temperatures

Inquiries have been received as to the details of the methods used in carrying out the tests reported in the Technical Bulletins. The data on experimental polymers will be interrupted from time to time to report on the special equipment employed in making the measurements.

IN THE EARLY TECHNICAL BULLETINS the measurements were made at room temperature. In order to speed up the tests the operating temperature was increased to 70 degrees C., beginning with Technical Bulletin No. 22. The equipment for maintaining an ambient temperature of 70 degrees C. was designed and built by the instrument shop, Technical Department, The New Jersey Zinc Co. (of Pa.) (See Figure I).

The reproducibility of cut-growth tests is greatly influenced by the mounting of the samples in the jaws, and to minimize this variable, the jig shown in Figure II is employed. The rubber specimens are first inserted in the frame, which keeps them in identical alignment until they are clamped in the jaws of the flexometer. This jig was also designed and built in the Technical Department instrument shop.

The tests are carried out in accordance with ASTM Designation D-813-44T with the following exceptions:

Needle diameter	0.047 inches
Flexing cycles	280 per minute
Ambient temperature . .	70 degrees C.

The samples are gripped 1⅛ inch from the end instead of the ASTM recommendation of 1⅜ inch. This changes the adjustment of the machine under Section 7 of the ASTM Specification to read as follows: "Approach each other to a distance of 1¼ inch and separate to a distance of 3½ inch. The results are reported in inches for the indicated number of cycles.

FIGURE I

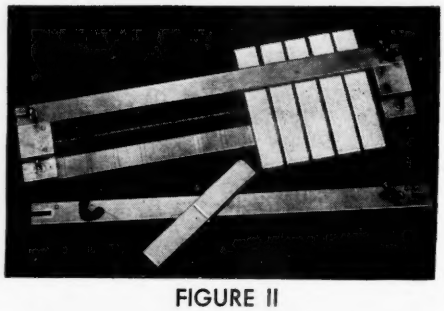

FIGURE II

HORSE HEAD PRODUCTS New Jersey zinc

THE NEW JERSEY ZINC COMPANY
160 FRONT STREET • NEW YORK 7, N. Y.
Products Distributed by THE NEW JERSEY ZINC SALES COMPANY
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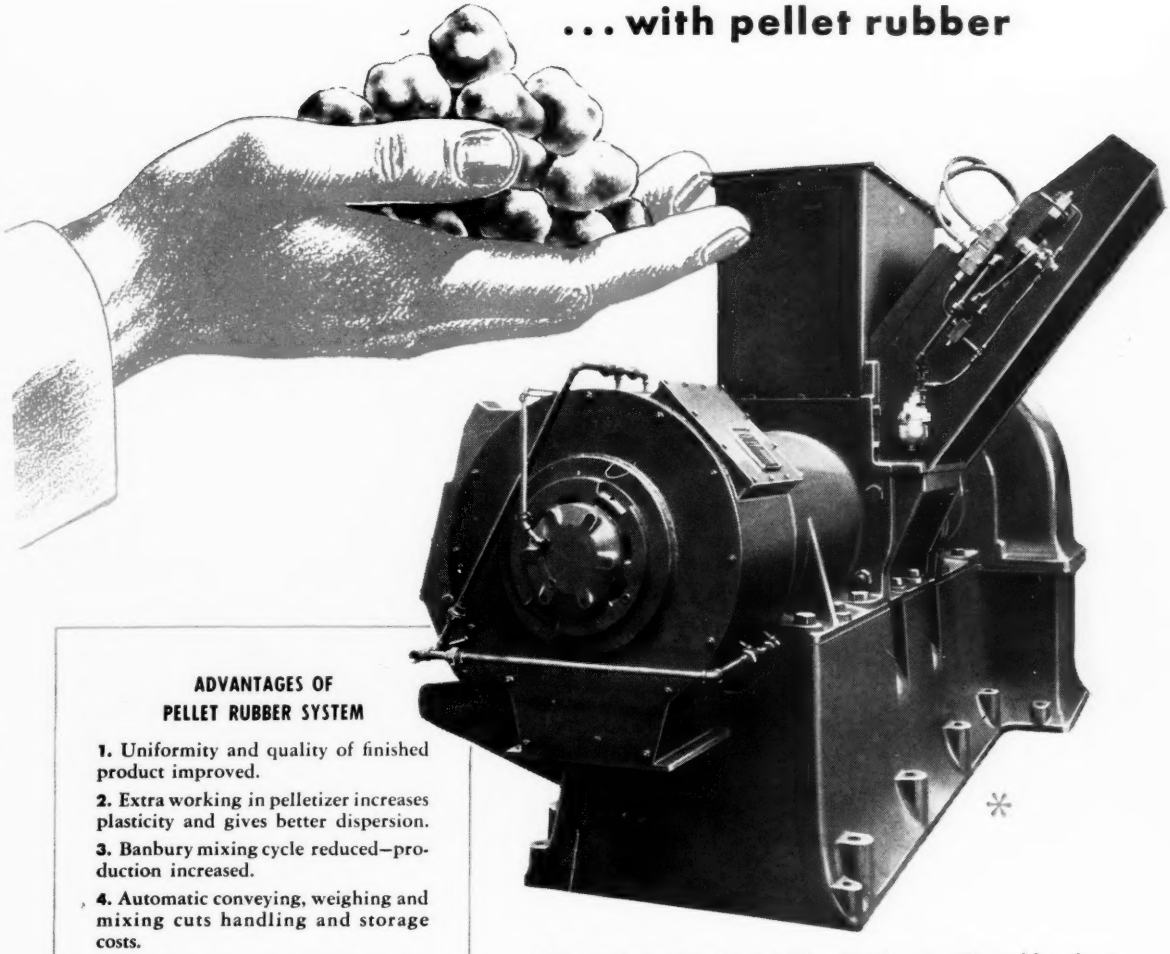
YOU GET A DOUBLE BONUS

. . . with pellet rubber



ADVANTAGES OF PELLET RUBBER SYSTEM

1. Uniformity and quality of finished product improved.

2. Extra working in pelletizer increases plasticity and gives better dispersion.

3. Banbury mixing cycle reduced—production increased.

4. Automatic conveying, weighing and mixing cuts handling and storage costs.

5. Less floor space required—floor storage and trucking eliminated.

6. Cleaner mill room—dust eliminated because pellet handling system completely sealed in.

7. Pellets thoroughly and quickly cooled—shorter time between processing operations—less stock in process.

* The Hale pelletizer is an extruding machine in which the screw forces the rubber up to the pelletizer head where the pellets are formed. The pellets are lightly coated, before leaving the machine, with a soapstone solution which prevents their sticking together.

Designed to transform bulky, hard-to-handle rubber into small, free-flowing pellets, the Hale pelletizer provides, in addition, a double bonus.

Exhaustive laboratory tests, confirmed by the experience of users, show that the extra working which the stock receives in passing through the pelletizer *improves the plasticity* and gives *better dispersion* of the various ingredients.

If you are interested in improving uniformity and quality of your finished product, while, at the same time, cutting your handling costs, send for complete information about the Hale pelletizer and the pellet rubber system. Write today—no obligation. FB-436

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y. • *Sales Offices:* Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston

Farrel-Birmingham

STOP DISCOLORATION

with

The New Stabilizer V·1·N

Stabilizes Vinyl Chloride Plastics and coatings against heat and exposure discoloration.

Yields

Transparent
Colorless
Odorless
Heat Resisting
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STAMFORD "FACTICE" VULCANIZED OIL

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Our products are engineered to fill every need in natural and synthetic rubber compounding wherever the use of vulcanized oil is indicated.

We point with pride not only to a complete line of solid Brown, White, "Neophax" and "Amberex" grades, but also to our aqueous dispersions and hydrocarbon solutions of "Factice" for use in their appropriate compounds.

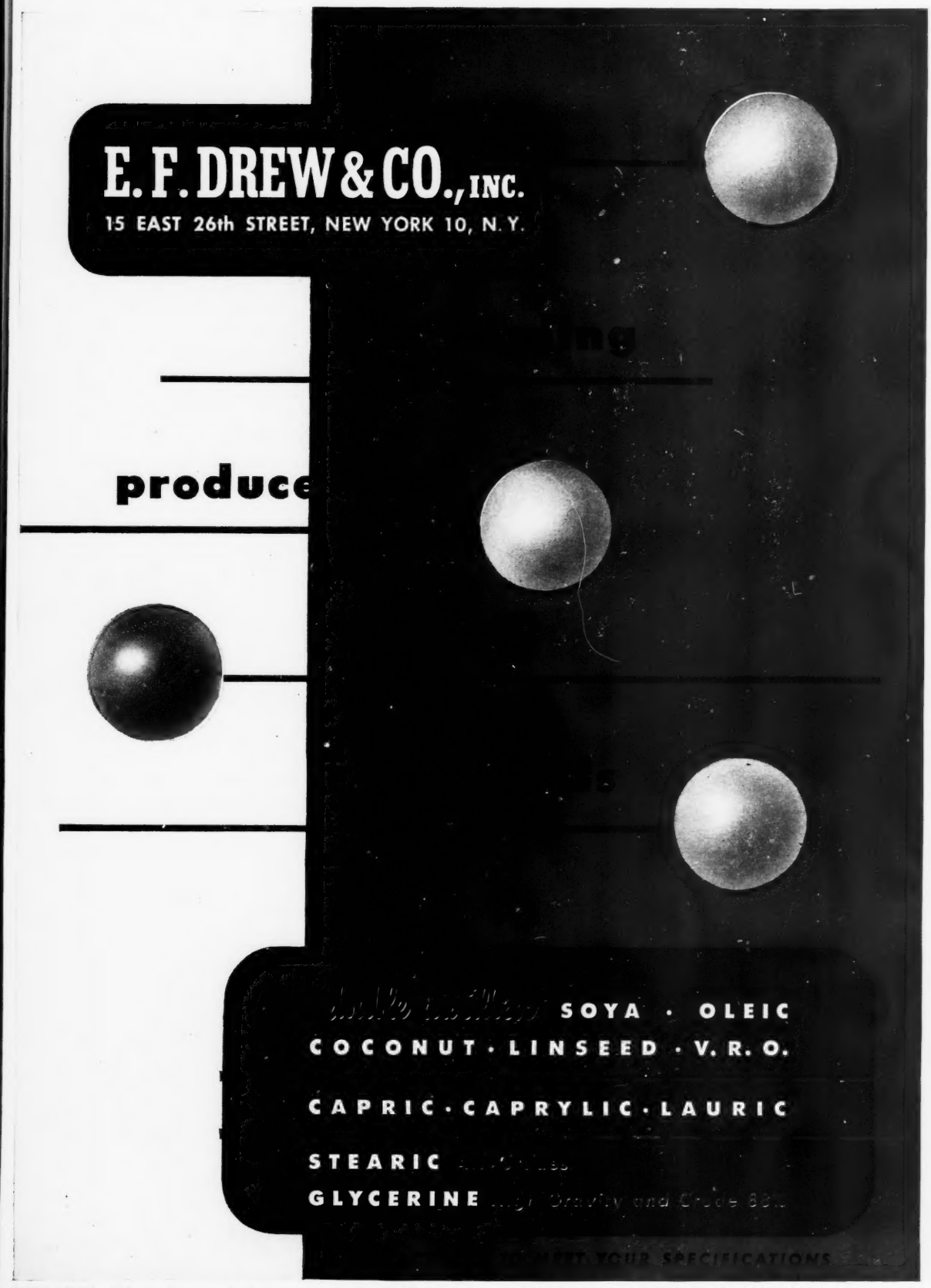
Continuing research and development in our laboratory and rigid production control has made us the leader in this field.

The services of our laboratory are at your disposal in solving your compounding problems.

THE STAMFORD RUBBER SUPPLY COMPANY

Stamford, Conn.

Oldest and Largest Manufacturers of "Factice" Brand Vulcanized Oil Since 1900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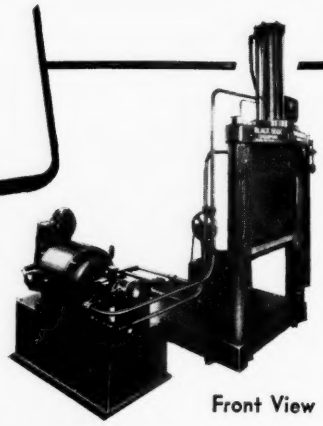

Front View

CHECK THESE ADVANTAGES:

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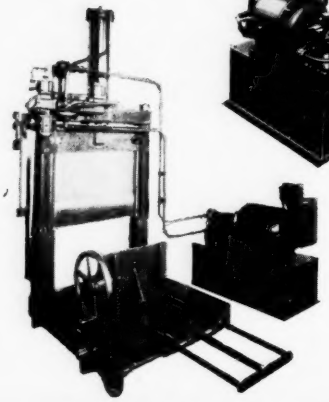

Rear View: shows manually operated stock feeding device as well as operating controls.

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*4 KBWX has opening of 45" wide by 36" high

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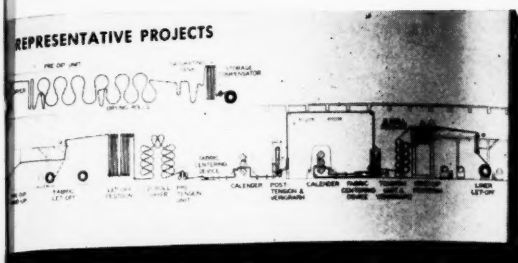

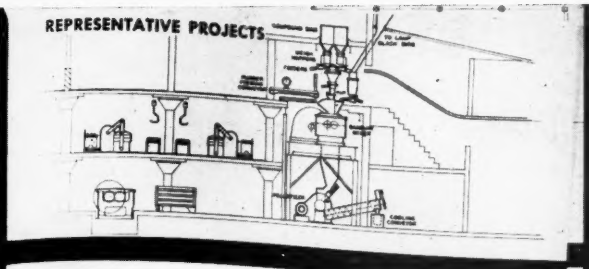

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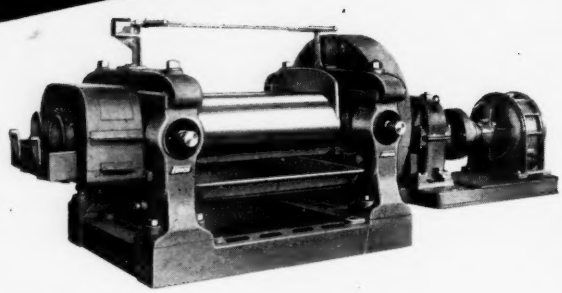

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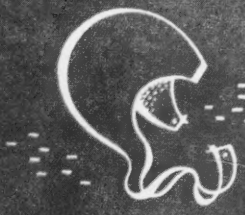

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Continuous Vulcanizing Machines
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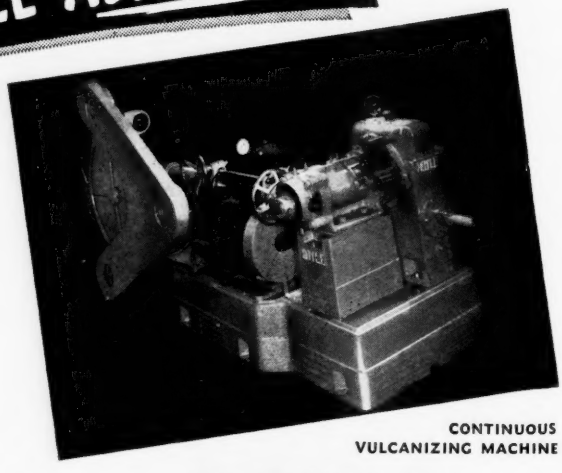

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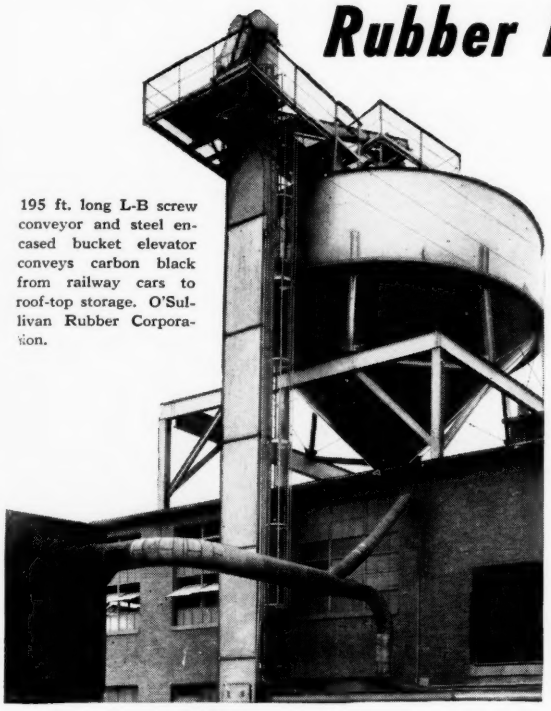
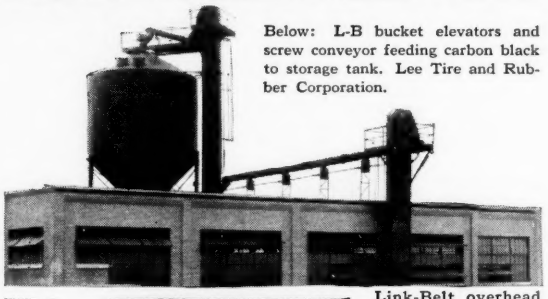
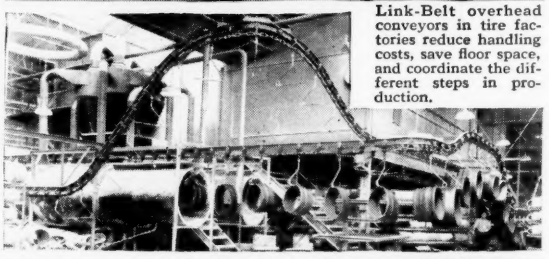
LINK-BELT CONVEYORS



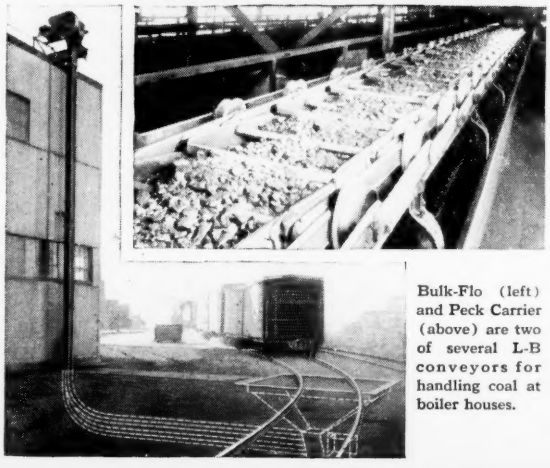
195 ft. long L-B screw conveyor and steel encased bucket elevator conveys carbon black from railway cars to roof-top storage. O'Sullivan Rubber Corporation.



Below: L-B bucket elevators and screw conveyor feeding carbon black to storage tank. Lee Tire and Rubber Corporation.



Link-Belt overhead conveyors in tire factories reduce handling costs, save floor space, and coordinate the different steps in production.



Bulk-Flo (left) and Peck Carrier (above) are two of several L-B conveyors for handling coal at boiler houses.

In the broad Link-Belt line, there's a type to suit every requirement . . . . .

● About the meanest handling job in the rubber industry is conveying carbon black, but makers and users alike are reporting highly satisfactory service from Link-Belt conveyors and elevators on this difficult assignment. Pictured here are typical installations of Link-Belt screw conveyors and bucket elevators, which have overcome major difficulties of handling this material in a clean and waste-free manner.

Link-Belt elevating and conveying machinery includes types especially suited to handling coal and ashes, as well as overhead conveyors for moving rubber sheets, rubber products and molds through the various processes. Link-Belt belt conveyors and Bulk-Flo elevator-conveyors have special advantages for certain types of materials. Consult Link-Belt and be sure to receive equipment of the right type, and helpful counsel from materials handling specialists, to make the most effective application.

LINK-BELT COMPANY

Chicago 8, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities. 10,508

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A TYPE FOR EVERY KIND OF MATERIALS HANDLING

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300 Gallon dissolver with vertical motor drive

The wide range of viscosities which this dissolver will handle, together with a variety in design of the agitator, provides a wide range of applications. When extreme violent mixing action is required, they are equipped with diffusion rings insuring adequate mixing action in the shortest possible time.

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Whatever your requirements remember this: NRM Heavy Duty Tubers are designed for high production of various compounds . . . for flexibility . . . closer control of processing temperatures . . . meeting desired dimensions more accurately . . . resulting in a uniformly higher quality stock.

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5 - Excellent aging characteristics.

6 - Excellent molding properties.

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Turgum S / Butac } *Resin-acid softeners*

FOR GR-S

NATAC inhibits stearic acid and sulphur blooms on uncured natural rubber and natural rubber / GR-S compounds...such as tire coat and friction stocks, tire repair materials, laminated mechanical parts, footwear frictions and gum parts.

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March, 1948

Volume 117 Number 6

A Bill Brothers Publication

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INDIA
RUBBER WORLD

Volume 117 | New York, March, 1948 | Number 6

The Manufacture and Properties of Philprene Low-Temperature Rubber

W. A. Schulze,[1] W. B. Reynolds,[1] C. F. Fryling,[1] L. R. Sperberg,[1] and J. E. Troyan[1]

THE phenomenal performance of low-temperature chemical rubber in numerous recent road tests has stimulated a great amount of interest in the physical properties of elastomers prepared in refrigerated emulsion systems. Recently Phillips Petroleum Co. announced that two types of low-temperature rubber are in production on pilot-plant scale in Phillips, Tex. This article reports the physical properties of these products in various furnace black and channel black recipes.

At the inception of the American synthetic rubber program there was no clear-cut evidence regarding the influence of many important process features of emulsion polymerization. In particular, very little was known concerning the effect of temperature of polymerization on polymer properties. In formulating the official "Mutual" recipe a polymerization temperature of 122° F. was chosen, largely because that temperature gave a reaction rate of the correct order of magnitude with the particular recipe chosen. At that time the temperature could not have been appreciably lower because no polymerization recipes were known which gave feasible rates at lower temperatures.

When the government research program got under way, the important process variables were more carefully evaluated. There were a number of indications during the period 1943 to 1945 that lowering the emulsion polymerization temperature improved the physical properties of chemical rubber. However the lack of suitable low-temperature polymerization recipes made it impossible to commercialize low-temperature rubber at that time. Furthermore the improvements shown at the polymerization temperatures examined were not striking enough to justify concerted effort directed toward the development of improved low-temperature recipes.

Phillips Petroleum became interested in the possibilities of low-temperature rubber early in the program, and in 1942 a pilot-plant was designed which was capable of handling emulsion polymerizations at temperatures as low as 0° F. (—18° C.). This pilot-plant was placed in operation in 1944.

Laboratory investigations of low-temperature polymerization utilized two general approaches: namely, ferricyanide activated diazo thio ether systems and iron activated "redox" systems. Diazo thio ethers were introduced as polymerization initiators at the University of Cincinnati, and they were first used in ferricyanide activated recipes at the University of Minnesota. The work at both universities was carried out under the auspices of the Office of Rubber Reserve, Reconstruction Finance Corp. "Redox" systems were described in patents assigned to The B. F. Goodrich Co., for which applications were filed in 1941. Apparently independently the Germans also developed "redox" recipes. Important contributions toward the development of practical "redox" systems were made from the University of Minnesota, and, in particular, the Minnesota group introduced the use of organic hydroperoxides as the oxidant in "redox" recipes.

Privately financed research in the Phillips laboratories and pilot-plant has led to the development of exceedingly rapid polymerization systems suitable for large-scale production of low-temperature rubber, and low-temperature rubber has been in pilot-plant production at Phillips, Tex., for well over a year.

The Philprenes

Philprene A[2] is the name applied to Phillips' chemical rubber produced at a polymerization temperature of 41° F. (5° C.). It is a butadiene-styrene copolymer containing approximately 24% bound styrene. The finished rubber preferably contains about 5% disproportionated rosin acid and in that respect is comparable with GR-S-10. Vulcanizates of Philprene A are characterized by high tensiles both at normal and elevated temperatures, high resilience, high flex life, good abrasion resistance, and exceptionally good processing characteristics. Although the exceptional properties of Philprene A are not limited to a particular type of carbon black reinforcement, especially good results are obtained through the use of

[1] Phillips Petroleum Co., research department, Bartlesville, Okla.
[2] A trade mark of Phillips Petroleum Co.

high abrasion furnace black. The physical properties of Philprene A in a typical Philblack O compound are compared with those of GR-S-10 in Tables 1, 2, and 3.

COMPOUND FOR TABLES 1—3

	Parts
Elastomer	100
Philblack O	45
Zinc oxide	3
Stearic acid	2
AgeRite	1.2
Sulfur	1.75
Santocure	0.95
Circo oil	2.75
Paraflux	2.26

TABLE 1. STRESS-STRAIN PROPERTIES OF PHILPRENE A AND GR-S-10 IN A PHILBLACK O TREAD RECIPE

Min. Cure at 307° F.	P. S. I. at 80° F. 300%	Break	% Elongation	P. S. I. at 200° F. 300%	Break	% Elongation
Philprene A						
10	380	1670	805	....	....	....
20	1110	3790	660	1220	1800	420
30	1500	3800	570	....	....	....
45	1620	4000	550	1720	1900	320
75	1700	4000	525	....	....	....
GR-S-10						
10	390	1210	645	....	....	....
20	1170	2420	500	1280	1290	305
30	1490	2690	455	....	....	....
45	1580	2600	425	....	1320	210
75	1650	2810	440	....	....	....

TABLE 2. HYSTERESIS PROPERTIES OF PHILPRENE A AND GR-S 10 IN A PHILBLACK O TREAD RECIPE

Min. Cure at 307° F.	Original: Heat Rise △T °F.*	% Perm. Set	Resilience†	Oven Aged 24 Hours at 212° F.: Heat Rise △T °F.*	% Perm. Set	Resilience†
Philprene A						
30	71.5	3.4	62	60	0.4	67
45	65.8	1.6	64	61	0.6	66
GR-S-10						
30	77.6	5.0	58	67	0.9	63
45	74.0	2.6	58	67	1.0	63

* Goodrich flexometer, 0.175-inch stroke, 143 p.s.i load, 100° F. circulating air oven, 15-minute test time.
† Yerzley oscillograph (at 80° F.).

TABLE 3. FLEX LIFE, SHORE HARDNESS, AND COMPRESSION SET FOR PHILPRENE A AND GR-S 10 IN A PHILBLACK O TREAD RECIPE

Min. Cure at 307° F.	Original: Flex Life M Flexures*	Shore Hardness	% Compression Set	Oven Aged 24 Hours at 212° F.: Flex Life M Flexures*	Shore Hardness	% Compression Set
Philprene A						
30	18	63	29	5	68	6.4
45	11	64	16	7	67	5.4
75	11	64	9.2	8	66	5.0
GR-S 10						
30	3	60	27	3	65	7.2
45	3	61	15	4	65	6.7
75	3	61	8.2	3	63	5.8

* Three-inch stroke DeMattia flexometer at 210° F. Thousands of flexures to 0.5-inch crack growth of pierced specimen.

COMPOUND FOR TABLES 4—6

	Parts
Elastomer	100
Philblack O	50
Zinc oxide	3
Asphalt No. 6	10
Sulfur	1.75
Santocure	0.80

TABLE 4. STRESS-STRAIN PPOPERTIES OF PHILPRENE B AND GR-S IN A PHILBLACK O TREAD RECIPE

Min. Cure at at 307° F.	P.S.I. at 80° F. 300%	Break	% Elongation	P.S.I. at 200° F. 300%	Break	% Elongation	Oven Aged 24 Hours at 212° F. 300%	Break	Elongation
Philprene B									
10	550	2600	790	....	....	....	2370	3470	410
20	1160	3680	660	1110	2130	515	....	....	....
30	1370	3490	565	....	....	....	2300	3620	440
45	1460	3740	575	1450	2100	390	....	....	....
75	1470	3900	590	....	....	....	1860	3490	465
GR-S (X-346)*									
10	730	2150	640	....	....	....	2560	2960	340
20	1500	2670	470	....	1340	295	....	....	....
30	1660	3180	500	....	....	....	2560	3090	350
45	1680	3140	485	....	1420	260	....	....	....
75	1620	2840	450	....	....	....	2110	2930	400

*Rubber Reserve Standard Bale GR-S.

TABLE 5. HYSTERESIS PROPERTIES OF PHILPRENE B AND GR-S IN A PHILBLACK O TREAD RECIPE

Min. Cure at 307° F.	Original: Heat Rise △T °F.*	% Perm. Set	Resilience†	Oven Aged 24 Hours at 212° F.: Heat Rise △T °F.*	% Perm. Set	Resilience†
Philprene B						
30	78.7	4.8	62	71.5	0.8	66
45	77.7	2.4	63	73.3	1.0	65
GR-S (X-346)						
30	74.2	4.4	58	67.5	0.7	65
45	73.5	2.3	58	68.5	0.8	64

*Goodrich flexometer—oven temperature 100° F.
† Yerzley oscillograph at 80° F.

TABLE 6. FLEX LIFE, SHORE HARDNESS, AND COMPRESSION SET FOR PHILPRENE B AND GR-S IN A PHILBLACK O TREAD RECIPE

Min. Cure at 307° F.	Original: Flex Life M Flexures*	Shore Hardness	%Compression Set	Oven Aged 24 Hours at 212° F.: Flex Life M Flexures*	Shore Hardness	%Compression Set
Philprene B						
30	56.0	62	20.7	11.2	66	8.0
45	26.0	63	14.2	9.7	64	7.4
75	45.0	63	10.1	13.9	63	7.5
GR-S (X-346)						
30	7.9	62	22.6	6.5	67	7.5
45	7.5	63	14.2	5.0	66	7.6
75	8.9	64	9.5	4.0	66	6.8

* DeMattia flexometer—three-inch stroke at 210° F. Thousands of flexures to 0.5-inch crack growth of pierced specimen.

The processability of the above Philprene A compound is superior to that of GR-S-10. Laboratory extrusion tests through a Garvey die indicate a faster extrusion and a smoother specimen. Factory processing of Philprene A has also indicated superior processability. In one tire factory the technical staff rated 60 Mooney Philprene A as 25% superior to GR-S-10 in over-all processing characteristics. The excellent processing characteristics permit compounding Philprene A at low softener levels for maximum tread wear. Even at low softener levels Philprene A tires have excellent cracking and cut-growth characteristics, particularly when compounded with Philblack O.

Philprene B[2] is the name applied to Phillips' chemical rubber produced at a polymerization temperature of 14° F. (—10° C.). It also is a butadiene-styrene copolymer containing approximately 24% bound styrene. Various embodiments of Philprene B contain fatty acid, disproportionated rosin acid or mixtures thereof, depending upon requirements. The physical properties of Philprene B are generally superior to those of Philprene A. In addition to excellent properties exhibited in tread recipes, Philprene B shows particularly interesting properties in carcass recipes at lower black loadings.

Tables 4 to 16 present the physical properties of Philprene B in various furnace and channel black tread and carcass recipes. Tables 4, 5, and 6 compare Philprene B with GR-S in a typical Philblack O tread recipe.

Tables 7, 8, and 9 compare Philprene B with GR-S in a typical channel black tread recipe.

Compound for Tables 7—9		
Philprene B	100*	...
GR-S (X-346)	...	100†
Wyex (No. 1)	50	50
Zinc oxde	3	3
Sulfur	1.75	1.75
Santocure	1.20	1.20
Asphalt No. 6	10	10
Disproportionated rosin acid	1	...

* Contained 2% fatty acid.
† Contained 5% fatty acid.

Philprene B appears to be of particular interest for use in tire carcasses. The data of Tables 10, 11, and 12 illustrate the properties to be expected from Philprene B in comparison with GR-S at low Philblack O loadings.

Table 7. Stress-Strain Properties of Philprene B and GR-S in a Channel Black Tread Recipe

Min. Cure at 307° F.	P.S.I at 80° F. 300%	Break	% Elongation	P.S.I. at 200° F. 300%	Break	% Elongation	Oven Aged 24 Hours at 212° F. 300%	Break	Elongation
Philprene B									
20	840	4000	710	740	2270	640	....	....	....
30	1090	4640	680	....	....	....	2100	3900	460
45	1260	4510	640	1040	1880	445	....	....	....
75	1240	4630	650	....	....	....	1780	4360	560
GR-S (X-346)									
20	760	2690	700	640	890	365	....	....	....
30	1150	3380	620	....	....	....	2070	2600	360
45	1330	3370	585	....	1110	275	....	....	....
75	1400	3310	555	....	....	....	1840	3100	460

Table 8. Hysteresis Properties of Philprene B and GR-S in a Channel Black Tread Recipe

Min. Cure at 307° F.	Original Heat Rise ΔT °F.*	% Perm. Set	Resilience†	Oven Aged 24 Hours at 212° F. Heat Rise ΔT °F.*	% Perm. Set	Resilience†
Philprene B						
30	70.2	3.2	66	61.4	0.8	70
45	66.5	3.0	68	63.5	1.0	70
GR-S (X-346)						
30	77.3	6.8	57	62.0	0.6	65
45	71.0	2.4	59	61.7	0.7	65

* Goodrich flexometer—oven temperature 100° F.
† Yerzley oscillograph at 80° F.

Table 9. Flex Life, Shore Hardness and Compression Set for Philprene B and GR-S in a Channel Black Tread Recipe

Min. Cure at 307° F.	Original Flex Life M Flexures*	Shore Hardness	% Compression Set	Oven Aged 24 Hours at 212° F. Flex Life M Flexures*	Shore Hardness	% Compression Set
Philprene B						
30	22.0	62	22	7.0	66	8.5
45	25.0	62	14	5.9	65	8.2
75	23.0	62	11	7.6	65	8.0
GR-S (X-346)						
30	4.5	61	31	3.8	66	9.2
45	6.4	62	19	4.5	66	8.2
75	7.1	63	10	3.6	65	7.2

*Three-inch stroke DeMattia flexometer at 210° F. Thousands of flexures to 0.5-inch crack growth of pierced specimen.

Compound for Tables 10–12	Parts
Elastomer	100
Philblack O	25
Zinc oxide	3.0
Asphalt No. 6	10.0
Sulfur	1.75
Santocure	1.25

Table 10. Stress-Strain Properties of Philprene B and GR-S in a Philblack O Carcass Recipe

Min. Cure at 307° F.	P.S.I. at 80° F. 300%	Break	% Elongation	P.S.I. at 200° F. 300%	Break	% Elongation	Oven Aged 24 Hours at 212° F. 300%	Break	Elongation
Philprene B									
10	350	3520	900	....	....	....	1210	2760	490
20	600	3740	700	630	790	340	....	....	....
30	630	3700	680	....	....	....	1090	2670	525
45	670	3700	680	....	670	290	....	....	....
75	610	4060	730	....	....	....	710	2880	640
GR-S									
10	460	2980	805	....	....	....	1520	1740	335
20	760	3040	645	....	470	210	....	....	....
30	850	3000	600	....	....	....	1370	2120	395
45	810	2819	590	....	530	230	....	....	....
75	760	2710	600	....	....	....	990	2470	505

Table 11. Hysteresis Properties of Philprene B and GR-S in a Philblack O Carcass Recipe

Min. Cure at 307° F.	Original Heat Rise ΔT °F.*	% Perm. Set	Resilience†	Oven Aged 24 Hours at 212° F. Heat Rise ΔT °F.*	% Perm. Set	Resilience†
Philprene B						
30	41.0	0.6	75	40.4	0.5	78
45	41.7	0.6	74	41.3	0.6	77
GR-S						
30	47.2	1.4	71	41.3	0.5	76
45	47.8	1.2	71	43.2	0.6	75

* Goodrich flexometer—oven temperature 100° F.
† Yerzley oscillograph at 80° F.

Table 12. Flex Life, Shore Hardness, and Compression Set for Philprene B and GR-S in a Philblack O Carcass Recipe

Min. Cure at 307° F.	Original Flex Life M Flexures*	Shore Hardness	% Compression Set	Oven Aged 24 Hours at 212° F. Flex Life M Flexures*	Shore Hardness	% Compression Set
Philprene B						
30	3.0	52	16.8	0.5	53	6.6
45	3.8	52	11.1	0.5	52	5.7
72	2.6	53	8.7	1.1	52	5.6
GR-S						
30	1.6	51	19.3	0.1	55	6.5
45	1.2	52	13.9	0.1	53	5.8
75	0.6	53	9.2	0.3	53	5.7

* DeMattia flexometer—three-inch stroke at 210°F. Thousands of flexures to 0.5-inch crack growth of pierced specimen.

Table 13. Mill Breakdown Characteristics of Unmodified Philprene B

Cold Milled, Minutes at Setting of 0.04-Inch	Inherent Viscosity*	% Gel†	Swelling Index‡
0	2.08	68	44
1	2.32	46	55
2	2.66	31	64
4	2.66	10	134
6	2.22	0	..
10	1.58	0	..
15	1.35	0	..
20	1.18	0	..
30	1.13	0	..

* Inherent viscosity $= \frac{\ln \eta r}{c}$, where ηr = the viscosity of a dilute solution of the polymer relative to that of the solvent, and c = the concentration in grams of solute per 100 ml. of solution. Cf. L. H. Cragg, *J. Colloid Science*, 1, 261 (1946).
† Benzone insoluble portion. Cf. C. S. Fuller, *Bell Syst. Tech. J.*, 25, 374 (1946); L. M. White, E. S. Ebers, G. E. Shriver, S. Breck, *Ind. Eng. Chem.*, 37, 770 (1945).
‡ The ratio of the weight of swollen gel to the weight of dry gel. Fuller, White, *et al.* as in (†) above.

Unmodified Philprene B

Although the standard Philprene B described above is modified to a Mooney value of 65, an interesting product is obtained when no modifier is used in the polymerization recipe. Unmodified Philprene B has an initial high Mooney value (>150), but breaks down rapidly upon milling, as indicated by the data of Table 13.

The physical properties of unmodified Philprene B are given in Tables 14, 15, and 16 in comparison with

GR-S . The compounding recipe used was for a channel black tread stock.

TABLE 14. STRESS-STRAIN PROPERTIES OF UNMODIFIED PHILPRENE B AND GR-S IN A CHANNEL BLACK TREAD RECIPE

Min. Cure at 307° F.	P.S.I. at 80° F. 300%	Break	% Elongation
Unmodified Philprene B			
20	1720	6000	580
30	2170	6000	585
45	2160	5520	480
75	2240	5520	465
GR-S (X-224)*			
20	960	3170	710
30	1210	3600	625
45	1520	3720	560
75	1600	3850	515

*Standard Bale GR-S. Lot prior to X-346.

TABLE 15. HYSTERESIS PROPERTIES OF UNMODIFIED PHILPRENE B AND GR-S IN A CHANNEL BLACK TREAD RECIPE

Min. Cure at 307° F.	Original: Heat Rise ΔT °F.*	Original: % Perm. Set	Original: Resilience†	Over Aged 24 Hours at 212° F.: Heat Rise ΔT °F.*	Over Aged 24 Hours at 212° F.: % Perm. Set	Over Aged 24 Hours at 212° F.: Resilience†
Unmodified Philprene B						
30	53.4	0.6	74	48.2	0.1	80
45	52.6	0.4	75	48.6	0.3	78
GR-S (X-224)						
30	77.8	5.2	59	59.8	0.3	68
45	71.6	1.8	62	62.8	0.6	67

* Goodrich flexometer—oven temperature 100° F.
† Yerzley oscillograph at 80° F.

TABLE 16. FLEX LIFE, SHORE HARDNESS, AND COMPRESSION SET FOR UNMODIFIED PHILPRENE B AND GR-S IN A CHANNEL BLACK TREAD RECIPE

Min. Cure at 307° F.	Original: Flex Life M Flexures*	Original: Shore Hardness	Original: % Compression Set	Oven Aged 24 Hours at 212° F.: Flex Life M Flexures*	Oven Aged 24 Hours at 212° F.: Shore Hardness
Unmodified Philprene B					
30	21	59.5	17.7	4.5	69
45	11	60.5	9.4	11.0	67.5
75	15	61	7.7	...	...
GR-S (X-224)					
30	19	55.5	35.4	9.1	65.5
45	10	56	18.7	13	66
75	13	57	9.6	...	...

*DeMattia flexometer—two-inch stroke at 210° F. Thousands of flexures to 0.5-inch crack growth of pierced specimens.

Conclusions

On the basis of numerous road tests of Philprene A tires on Phillips Petroleum Co. test vehicles, it can be stated that the abrasion resistance (tread wear) of Philprene A is 20 to 40% superior to that of GR-S 10. Normally, an improvement in tread wear is accomplished only at the expense of poor cracking and cut-growth characteristics. However the excellent hysteresis-flex life characteristics of Philprene A shown in Tables 2 and 3 are reflected in excellent cracking and cut-growth characteristics of Philprene A tires. These comments apply to Philprene A treads when either channel or furnace black reinforcement is utilized. However, when HAF (high abrasion furnace) black reinforcement is used, a marked improvement in the tread wear and cracking characteristics of both GR-S and Philprene A is obtained. Also, it can be stated positively that Philprene A treads reinforced with Philblack O are superior in both tread wear and cracking characteristics to first-line natural rubber treads.

Philprene B was developed and manufactured on a pilot-plant scale at a somewhat later date than Philprene A; consequently there has not yet been sufficient time for building and extensive testing of tires. However the excellent physical properties suggest that this product will also be of outstanding value in tire treads. The properties of Philprene B at low black loadings suggest its potential use in tire carcass stocks.

The properties of Philprene low-temperature rubber suggest many applications in the latex, wire and cable, and mechanical goods industries. Obviously, still other uses will be established as more experience is gained in handling these new synthetic products which have already attracted so much interest.

Letter to the Editor

THE following reply has been received from P. T. Bauer, author of the article, "Malayan Rubber Policies," in answer to the letter from Dr. Frederick J. Paton on this article, which appeared in our February issue, page 616.

January 27, 1948

THE EDITOR,
India RUBBER WORLD.
SIR:

Dr. Paton's letter is largely abusive and makes little attempt to answer my arguments. His only point which is not personal abuse refers to the availability of budwood to smallholders. Advertisements of proprietary clones in the English language papers were of little interest to smallholders, especially as the sellers generally insisted on a guarantee that the budwood would not be multiplied for resale and this guarantee the smallholders could furnish in an acceptable form.

As stated in my article, the smallholders had virtually no opportunity to plant since 1934, owing to the technical and economic impossibility of replacing the smallholdings; the validity of my arguments on this subject has since received official recognition.

The rapid progress of smallholders until the advent of restriction (especially the phenomenal rise in the Netherlands East Indies native industry) is adequate reply to the concluding sentence of Dr. Paton's letter and throws into relief the general level of his arguments.

As regards my personal position, I belong to no political party and have always kept out of politics. A reading of my article will, however, make it clear that I am a strong believer in private property and in individual ownership. My views are frequently distorted to suggest that I am a left wing critic of private enterprise and of the white man's work in the tropics; this, however, is entirely untrue as is obvious from a full reading of my articles. There are no anti-imperialist cliches in my writings; I have no doubt that British rule has greatly benefited Malaya. Nor were my quotations out of context, though for obvious reasons of space I was unable to reproduce entire books or articles; it would have much strengthened my arguments had I been able to quote at greater length. Nor have I suffered any injury or iniquity at the hands of the Malayan Government, the Rubber Research Institute of Malaya, or the estate industry. When I visited Malaya in 1946 (having been sent out by the Colonial Office), I was received with great courtesy, especially by the Rubber Research Institute in Malaya whose officers assisted my inquiries, a fact which is fully acknowledged in my official report on the visit. I am happy to enjoy the personal friendship of the outstanding leader of the British side of the estate industry. But I am committed by my academic position to go where the arguments lead me; I am a University Reader in Agricultural Economics in London and Fellow of a Cambridge College.

Dr. Paton gives as his address Malacca, F. M. S.

(*Continued on page* 813)

Pliolite Latex 190 in Latex Compounding[1]

J. A. Weatherford[2] and F. J. Knapp[2]

LATEX compounders have long sought a filler material which would reinforce the standard rubber latices when incorporated with them. Rubber latex mixes are not reinforced by carbon black as are the dry rubber stocks.[3] The other rubber reinforcing materials do not appear to reinforce latex as the addition of fillers tends to weaken the latex film rather than improve it.[4]

In the search for a reinforcing material for latex, the experience obtained in the development of a resin for reinforcing rubber stocks was utilized. The early investigation of butadiene-styrene copolymers indicated that some interesting resinous materials might be obtained when the styrene content was increased beyond 65%. Research work by Borders, Juve, and Hess[5] resulted in several useful copolymer resins containing 80-95% styrene which exhibit few rubber-like properties but have the ability to reinforce natural and synthetic rubber stocks.[6] This group of resins is known as the Pliolite[7] resins, and, since some of them are excellent reinforcing agents for rubber stocks, it was thought that they might add reinforcement to latex.

This paper describes the properties and uses of one of these resinous copolymers in latex form as a reinforcing material for natural and synthetic rubber lactices. This new resin latex is now identified as Pliolite Latex 190 since its use in latex compounding is analogous to the use of the Pliolite resins in rubber compounding.

[1] Presented before the Division of Rubber Chemistry, A. C. S., New York, N. Y., Sept. 17, 1947.
[2] Chemical products development division, Goodyear Tire & Rubber Co., Akron 16, O.
[3] C. F. Flint, "Chemistry and Technology of Rubber Latex," p. 236, D. Van Nostrand Co., Inc., New York, 1938.
[4] *Ibid.*, p. 306.
R. J. Noble, "Latex in Industry," p. 91, *Rubber Age*, New York, 1936.
[5] *Ind. Eng. Chem.*, 38, 955 (1946).
[6] Thies and Aiken, *Rubber Age* (N.Y.), 61, 51 (1947).
[7] Pliolite is a trademark of The Goodyear Tire & Rubber Co.

Properties of Pliolite Latex 190

Pliolite Latex 190 is a highly stable water dispersion of a resinous copolymer containing approximately 10 parts of butadiene and 90 parts of styrene. The latex has a solids content of about 30% and is stabilized with ammonium soaps, is alkaline, has a specific gravity of 1.01 and a surface tension of approximately 35 dynes per centimeter. Its viscosity is in the range of 10-20 centipoises as measured by the Brookfield viscosimeter.

The dried resin is a white thermoplastic granule or powder which is practically odorless and is non-toxic in normal processing or handling. It has a specific gravity of 1.03 and a heat distortion point of approximately 52° C. Resistance of the resin to acids and alkalies is excellent. It is also very resistant to oxidation and moisture. Since the resin has very little unsaturation, it is possible to compound the rubber with normal sulfur and accelerator ratios and to vulcanize under normal conditions.

Compounding Procedure

An investigation was made to determine the effect of adding Pliolite Latex 190 to natural rubber latex, Neoprene Latex Type 571, GR-S Type III Latex, and Chemigum Latex Type 200 (a butadiene-acrylonitrile copolymer). Each latex was compounded with typical curing ingredients; then the resin latex was added in the ratio of 0, 10, 15, and 20 parts per 100 parts of the latex on a dry weight basis.

A given amount of the compounded latex was cast on clean glass plates so as to obtain dry films approximately 0.040-inch in thickness. The films were allowed to dry for 24 hours at room temperature and then were removed from the glass plates and suspended in air to dry for an additional 48 hours. They were then cured in a circulating hot air oven, and the physical properties of the films were determined.

Test procedures were standardized for this complete

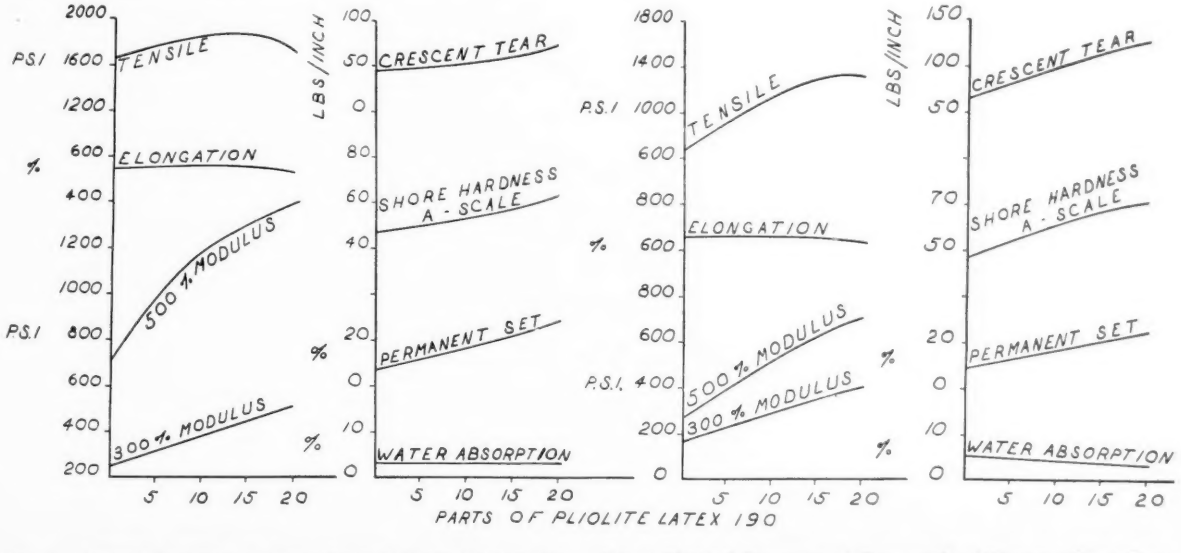


Fig. 1. Physical Properties of Compounds of Natural Latex Containing Pliolite Latex 190

Fig. 2. Physical Properties of Compounds of Neoprene Latex Type 571 Containing Pliolite Latex 190

program, and sufficient lots of each compounded latex were tested to make certain that the test data could be reproduced. In some cases the results obtained on the compounded latices containing no resin latex are higher or lower than those previously published. However, as this work was designed to determine the effect of Pliolite Latex 190 on other latices, comparative values were considered sufficient.

The data presented in this paper were obtained by using representative formulae for each type of latex. However, as can be expected, the adjustment of accelerators, cure time, and cure temperature will alter the results to some degree.

The Effect of Pliolite Latex 190

Figure 1 shows the results obtained with Pliolite Latex 190 in the natural latex formulation shown below:

	Dry Weight
Natural latex	100.0
Potassium hydroxide	0.5
Sulfur	1.0
Zinc oxide	5.0
Setsit-5	3.0
AgeRite Stalite	1.0

Air cure: 15 min. at 200° F.

It is seen that the tensile strength of natural rubber latex is increased slightly with only a slight decrease in elongation with the addition of up to 15 parts of the resin latex. The stiffness is increased greatly by the addition of the reinforcing latex; 15 parts double the 300% modulus; while 20 parts increase the 500% modulus fivefold.

The resin latex improves the tear resistance and increases the Shore hardness of natural latex. Twenty parts raises the tear strength about 50% and increases the hardness 25 points. The permanent set is increased to about 30%; while the water absorption is decreased to 40% of the original value.

Figure 2 shows the results obtained with Pliolite Latex 190 in the neoprene latex formula given below:

	Dry Weight
Neoprene Latex Type 571	100.00
Casein	0.75
Aquarex D	0.25
Sulfur	2.00
Zinc oxide	5.00
Setsit-5	3.00
AgeRite Stalite	1.00

Air cure: 15 min. at 285° F.

The tensile strength of neoprene latex is raised about 25%, with only a slight drop in elongation by the addition of 20 parts of Pliolite Latex 190. The resin latex gives a large increase in stiffness as 20 parts treble the value of the 300% modulus and raise the 500% modulus fourfold.

The tear strength of neoprene latex is increased about 30% and the Shore hardness about 25 points by the addition of 20 parts of the reinforcing latex. The permanent set is increased; while the water absorption is reduced slightly.

Figure 3 shows the results obtained with Pliolite Latex 190 in the GR-S Type III Latex formulation below:

	Dry Weight
GR-S Type III Latex	100.0
Casein	2.0
Sulfur	2.0
Zinc oxide	5.0
Setsit-5	3.0
AgeRite Stalite	1.0

Air cure: 15 min. at 220° F.

Type III Latex containing up to 15 parts of the resin latex shows a slight improvement in the tensile strength, with very little effect on the elongation. The stiffness is increased since 20 parts double the value of both the 300% modulus and the 500% modulus.

The tear strength of Type III Latex is improved about 55%, and the Shore hardness increased about 15 points by the addition of 20 parts of Pliolite latex. Increasing amounts of the resin latex increase the permanent set and appear to have little effect on the water absorption of Type III Latex.

Figure 4 shows the results obtained with Pliolite Latex 190 in the X-type latex formulation given below:

	Dry Weight
Chemigum Latex Type 200	100.0
Casein	1.0
Sulfur	2.0
Zinc oxide	5.0
Setsit-5	3.0
AgeRite White	1.0

Air cure: 5 min. at 250° F.

The resin latex gives much higher tensile values to Chemigum Latex Type 200 while affecting the elongation only slightly. Fifteen parts double the tensile strength. The stiffness of the X-type latex is greatly increased;

(*Continued on page 748*)

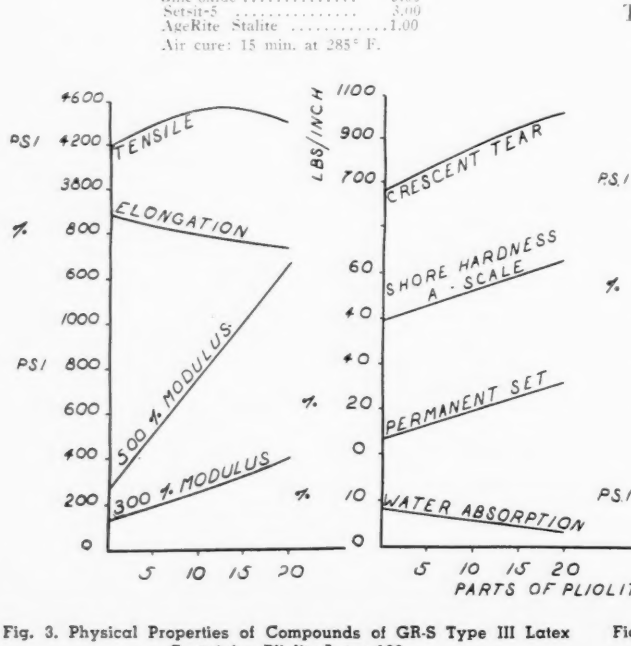


Fig. 3. Physical Properties of Compounds of GR-S Type III Latex Containing Pliolite Latex 190

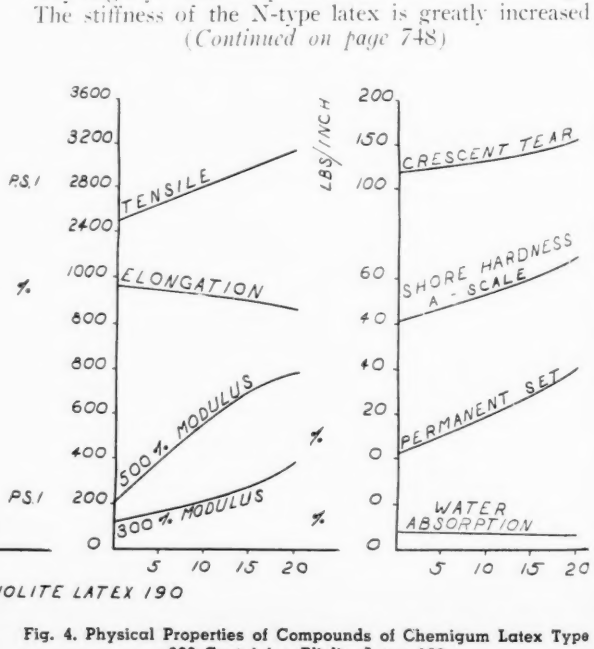


Fig. 4. Physical Properties of Compounds of Chemigum Latex Type 200 Containing Pliolite Latex 190

Contributions of Organic Chemistry to the War Effort—Synthetic Rubber—V[1]

R. F. Dunbrook[2]

THIS installment, the fifth in the series, concludes the article by the former head of the Copolymer Research Branch of the Office of Rubber Reserve, which reviews the government research program on synthetic rubber from the viewpoint of the organic chemist.

Popcorn Polymer

The term popcorn polymer in the GR-S plants is associated with the solid material insoluble in styrene or benzene which forms in the recovery system of the plants such as the booster condensers, pipe lines, flash tanks, styrene decanters, etc. The material is fairly dense, if formed in a confined space; otherwise it is of very low density. Because of its physical appearance, it is referred to as "popcorn polymer."

The factors responsible for its formation were investigated by a number of workers in the government synthetic program (58). Whitby and Zomlefer (59-60), of the University of Akron, showed that it was essentially dependent on the presence in the styrene of a small amount of butadiene, which under the conditions prevailing was capable of cross-linking polystyrene and leading to insoluble polymer. They showed further that such insoluble polymer has the ability to act as seed and grow in fresh styrene (even if the latter is free from butadiene) to form more insoluble polymer so that, once this type of polymer has made its appearance in a styrene recovery system, the latter is in effect "infected."

It has been shown that this type of polymer belongs to a class of abnormal polymers, which includes products previously designated as "cauliflower" polymer (in the case of dimethylbutadiene), "granular" polymer (in the case of chloroprene), "sponge" polymer (in the case of butadiene and isoprene, etc.), and which Whitby and Zomlefer have called generally "proliferous polymers" because of their irregular, proliferative habit of growth. This habit of growth arises from the fact that popcorn polymerization does not occur through the body of the monomer generally, but occurs only in that part of the monomer which is imbibed by the seed (59). These authors have prepared many samples of such polymers. From styrene they obtained them by polymerization in the presence not only of butadiene, but also of other cross-linking agents, including divinylbenzene, di-2-chloroallyl maleate, 2-chloro-allyl crotonate; from methyl methacrylate, chlorostyrene and vinylpyridines containing butadiene; from methacrylonitrile containing divinylbenzene. They also obtained them from styrene containing isoprene, but (perhaps because isoprene is a less potent cross-linking agent than butadiene) a higher proportion of isoprene was needed than of butadiene.

The ability of popcorn polymers to grow in fresh monomer is not specific in the sense that the substrate must be chemically identical with the monomer from which the popcorn polymer was derived. Polybutadiene which had been prepared in emulsion and which, owing to the absence of an antioxidant, had become insoluble on keeping was also found to have the ability to proliferate (59). Furthermore popcorn polystyrene will proliferate not only in styrene, but also in methyl methacrylate or in dimethylbutadiene; popcorn polychloroprene will grow in styrene. The whole phenomenon of popcorn polymerization is closely related to and throws interesting sidelights on the problem of cross-linking. The proportion of cross-linking agent necessary to form popcorn polymer initially may be very small — according to Whitby and Zomlefer, of the order of one cross-link to 1,500 or more monomer units of styrene or to 3,000 or more monomer units of methacrylonitrile. This initial popcorn polymer is capable of growing in and converting to more insoluble polymer (of extremely low swelling capacity), say 50 times its own weight of additional monomer.

In connection with the ability of popcorn polymer to grow in styrene, these authors expressed the opinion that "there are in the seeds active centers — perhaps represented by a peroxidic condition of pendant vinyl groups— and that activated styrene units attach themselves to these centers and grow to long chains. It may then be supposed that the seed molecules, now vastly enlarged, remain insoluble partly because of their original cross-linked structure and partly because of their great size" (59).

Considerable attention has been given to the problem of inhibiting popcorn polymerization. Whitby and Zomlefer tried several hundred organic inhibiters, and although some were capable of inhibiting the initiation of popcorn polymerization, none was competent to prevent indefinitely the growth of already-formed popcorn polymer seed. Incidentally, this work disclosed several powerful, new inhibiters of the normal (non-popcorn) polymerization of styrene including phenothiazine, quinoneimines such as indophenol, and picric acid. In accord with its antioxidant properties, the acetone extract of *Hevea* also was found to inhibit the polymerization of styrene.

Kharasch (61) in his investigation of the problem found that popcorn polymer from the synthetic rubber plants all gave a strong test for peroxides. It was further noted that old samples of elastomers (both polybutadiene and butadiene-styrene copolymer) which have not been treated with an antioxidant, and which therefore contain peroxides, possess the same ability (as popcorn seed) to yield benzene-insoluble polystyrene. Old GR-S polymer, however, which has been treated with phenyl-β-naphthylamine at the time of coagulation, contains no peroxides and is devoid of activity and, when added to styrene, gives benzene-soluble polystyrene. These observations suggest that peroxides of the polymers are somehow connected with popcorn formation.

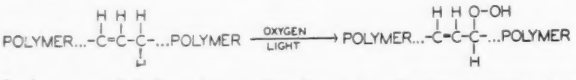
The presence of peroxides in the seed, however, is not the sole requisite for its activity because a material containing peroxides grows in styrene only if it is insoluble therein. Monomeric organic hydroperoxides, or soluble polymers containing peroxides, do not cause the formation of popcorn polymer when incubated with styrene.

[1] Presented before Division of Organic Chemistry, A. C. S., Chicago, Ill., Sept. 11, 1946.
[2] Office of Rubber Reserve, RFC, Washington, D. C. Present address, Firestone Tire & Rubber Co., Akron, O.
[3] Bibliography references appear at end of this installment.

Therefore insolubility of the seed appears to be a factor contributing to its activity.

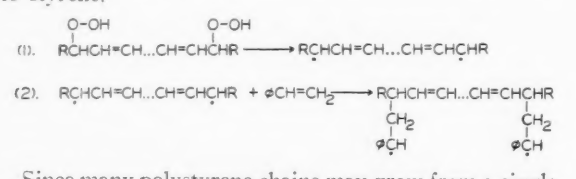
It was also found that certain materials, insoluble in styrene, but ineffective as seeds can be activated by exposing them to the action of oxygen and light. These "activation" experiments will be discussed below.

The foregoing observations have suggested that the phenomenon of active seed growth is determined by two factors: (1) the active seed must be a material insoluble in organic solvents (i.e., benzene or styrene), but must, nevertheless, swell in them; (2) active seed must contain a relatively large number of peroxide groups (chiefly hydroperoxides) attached to the insoluble molecule. Since these peroxidic groups are formed most readily by an attack of oxygen on the —CH_2—groups adjacent to the double bond



it is essential for the activation of a benzene-insoluble polymer that it contain unsaturated groups; the more of these present, the greater presumably will be the activity of the activated polymer.

When the active seeds are heated with styrene, the peroxides decompose to produce free radicals which add to styrene.



Since many polystyrene chains may grow from a single-seed molecule, there is produced a highly branched structure. Because of this branching and also because of the fact that the polystyrene chains grow from a molecule that is already insoluble, the resulting popcorn polymer is likewise insoluble.

Experiments were therefore carried out in order to determine whether or not there is any correlation between the seed growth activity of various samples of popcorn polymer (both those obtained from industrial plants and those prepared in the laboratory) and their peroxide content (determined by a modification of the method of Robey and Wiese). In a large number of specimens of industrial popcorn polymer the growth activities fall in the same order as the peroxide contents.

Furthermore, if the ability of popcorn (or, for that matter, any other insoluble polymer) to grow in styrene is due to its peroxide (or hydroperoxide) content, it follows (because of dilution of the peroxides present in the seed and destruction of some of them) that a given amount of "first generation" polymer should be less active than the original seed, and "second generation" popcorn less active than the first. These expectations were fully realized.

It follows from the proposed hypothesis that there is nothing unique about popcorn polymer as formed in the industrial plants, and that any organic substance, irrespective of its appearance, which possesses the requisite properties outlined for active seeds should, when added to styrene, lead to the formation of polystyrene insoluble in benzene. Such has, indeed, been found to be the case. Furthermore materials which show no activity can be caused to act as seed simply by conferring on them the properties which are assumed to be necessary for active seeds.

A sample of polybutadiene polymer and of high conversion GR-S copolymer was prepared. When first isolated, these polymers give weak or no test for peroxides, and seeds of these materials show no tendency to grow when heated with styrene. After these polymers are illuminated (Mazda lamp) in air for a few days, however, they give a strong test for peroxides. Seeds of both of these polymers then grow rapidly in styrene, and the polystyrene formed is insoluble in benzene. In air, in the absence of light, it takes a few weeks, instead of a few days, for these polymers to absorb sufficient oxygen to give a strong peroxide test. Once this stage is reached, however, the polymers become very "active seeds." The polybutadiene polymer is easier to activate, both in the dark and in the light, than the GR-S copolymer. The benzene-insoluble polystyrene, formed with the aid of these active seeds, has the physical appearance usually associated with typical popcorn polymer.

Finally, the postulated requirements for the preparation of active seeds were confirmed by experiments with linseed oil and with tung oil. These substances are, of course, entirely different from butadiene or styrene; yet, when properly treated, they fulfill the specifications required of materials which produce active seeds. When the oils are illuminated (Mazda lamp) in an open dish while a slow stream of air is passed over the surface of the oils, they become thick and give a strongly positive test for organic peroxides. These insoluble materials then show marked activity as seeds and rapidly convert styrene into an insoluble polystyrene of the popcorn type.

Of the many substances examined by Kharasch at the University of Chicago, tetranitromethane and the oxides of nitrogen (NO_2 or N_2O_3) are particularly effective as deactivators of popcorn seed. The vapors of either of these substances are rapidly absorbed by active popcorn polymer. The product formed is a hard brown material which, when incubated with styrene, no longer shows any tendency to grow. This product, moreover, inhibits the ordinary thermal polymerization of styrene for very long periods.

There are other parts of the monomer recovery units where the seed inhibition method of popcorn polymer control may be desirable. One such part is the seal water system where the pipes carrying water saturated with butadiene and styrene may become completely clogged with popcorn polymer. For control of popcorn polymer in these pipes, a water soluble inhibiter should be the most effective. With this idea in mind a solution of sodium nitrite was investigated and found to be an excellent inhibiter of both popcorn seed growth and of styrene polymerization.

Monomers

A large number of monomers were synthesized in the synthetic rubber program. Most of these were prepared at the University of Illinois though many were prepared in the laboratories of the rubber companies and various chemical companies (62-67). Some excellent synthetic organic chemistry was involved in the preparation of these monomers. Much of this work has already been published, and other papers covering the synthesis of these monomers are in press. These monomers were copolymerized with butadiene, and the physical properties of the copolymers were determined. A partial list of monomers synthesized is shown in Table 22.

In general, it may be said that most of the copolymers did not show any unusual properties. It must be remembered, however, that in most cases the amounts of monomers available were limited, and, consequently, only small amounts of polymers were available. It was therefore impossible thoroughly to evaluate the copolymers by building tires and evaluating them.

Certain mixtures of o-, m-, and p-chlorostyrenes as well as 2,5-dichlorostyrene were available commercially and were copolymerized with butadiene in sufficient quantities to obtain a complete evaluation. In general, the rate of polymerization with butadiene-chlorostyrene polymers was faster than with the butadiene-styrene copolymers. Less DDM for a given Mooney value at the same conversions was required. The chlorostyrene used also polymerized faster than the butadiene so that the chlorostyrene in the polymer at a given conversion was higher than the charging ratio.

TABLE 22. MONOMERS SYNTHESIZED FOR THE SYNTHETIC RUBBER PROGRAM
(An E in parenthesis indicates that a copolymer with butadiene has been evaluated)

o-Chlorostyrene (E) (68)
m-Chlorostyrene (E) (68)
p-Chlorostyrene (E) (68)
α-Chlorostyrene
2,3-Dichlorostyrene (E) (66)
2,4-Dichlorostyrene (E) (66)
2,6-Dichlorostyrene (E) (66)
3,4-Dichlorostyrene (E) (66)
3,5-Dichlorostyrene (E) (66)
2,4,6-Trichlorostyrene
Pentachlorostyrene
m-Fluorostyrene (E) 68)
p-Fluorostyrene (E) (68)
o-Bromostyrene (E) (68)
m-Bromostyrene (E) (68)
p-Bromostyrene (E) (68)
m-N,N-dimethylaminostyrene
m-N-methylaminostyrene
m-N-acetyl-N-ethylaminostyrene
p-N,N-dimethylaminostyrene (67)
p-N,N-dimethylsulfonamidostyrene (69)
α-(N,N-methylphenylamino)styrene
p-Phenylstyrene
m-Nitrostyrene (67)
p-Vinyl benzoic acid (65)
2-Vinylfuran (70)
2-Vinylquinoline
2-Vinylpyridine (E)
4-Vinylpyridine (E)
2-Vinyl-4-methylpyridine (E)
2-Methyl-5-vinylpyridine (E)
1-Vinyl-2,5-dimethylpyrrole
Vinylphthalimide
α-(N,N-dimethylamino)-styrene
p-Vinylphenylacetate
p-Methoxystyrene (E) (62,71)
m-Methoxystyrene (E) (62,71)
3,4-Dimethoxystyrene (62,71)
p-Phenoxystyrene (E) (62,71)
3-Methyl-6-methoxystyrene (E) (62,71)
3-Methyl-4-methoxystyrene (E) (62,71)
2-Methoxy-5-methylstyrene (E) (62,71)
2-Methoxy-5-n-propylstyrene (62,71)
2-Methyl-4-methoxy-5-isopropylstyrene (62,71)
4-Propenyl veratrole
Anethole
m-Methylstyrene (E) (67)
3,5-Dimethylstyrene (E) (72)
2,4-Dimethylstyrene (E) (72)
2,5-Dimethylstyrene (72)
3,4-Dimethylstyrene (E) (72)
m-sec.-Butylstyrene (E) (64)
m-tert.-Butylstyrene (E) (64)
p-Cyclohexylstyrene (64)
m-Phenylstyrene
m-Trifluoromethylstyrene (E) (67)
p-Cyanostyrene (E) (65, 73)
Methyl-p-vinyl benzoate (65)
6-Vinylquinoline
3-Vinylpyridine (E)
2-Vinyl-5-ethylpyridine (E) (63)
2-Vinyl-6-methylpyridine (E)
2-Vinyl-4,6-dimethylpyridine (E)
Vinylthiopene (E) (70)
Vinylsuccinimide

The 2,5-dichlorostyrene polymers were superior to GR-S in mill breakdown, hot tensile and elongation, and resistance to flex cracking (74). Although the hot tensile properties were higher than those for GR-S, the compounded stocks also showed higher brittle points with increasing amounts of dichlorostyrene. Thus on the basis of brittle point, not more than 30% of dichlorostyrene can be used in the initial charge if low temperature properties equivalent to GR-S are desired.

Evaluation of the butadiene-mono and dichlorostyrene polymers in truck tires showed from 15 to 20% improvement in wear (75).

2-Vinylpyridine which is commercially available and a number of alkylated vinyl pyridines which were synthesized were copolymerized with butadiene, and the copolymers were evaluated.

The butadiene-alkylated vinylpyridine copolymers did not show any superiority over butadiene-2-vinylpyridine copolymer (76). The butadiene-2-vinylpyridine rubbers are superior to GR-S in resistance to flex cracking and tearing, resilience, and tensile properties. The principal drawback to the use of vinylpyridine in tires lies in their incompatibility with other rubbers. This prevents its use with natural rubber or GR-S and makes difficult the problem of obtaining sufficient building tack. The vinylpyridine rubbers are faster curing than GR-S, and this characteristic causes a tendency to scorch during processing. Butadiene-vinylpyridine copolymers also have a tendency to become hard and brittle on continued exposure to heat. The isoprene-vinylpyridine copolymer, however, does not exhibit this tendency.

Thus the copolymers of butadiene with the mono- and dichlorostyrenes and with 2-vinylpyridine are the only ones which showed certain advantages over GR-S. Sufficient quantities of the chlorostyrenes and vinylpyridine were available to carry out a rather complete evaluation of copolymers of these materials. Other monomers were synthesized in the laboratory, and usually only small quantities were available. In some cases preliminary physical tests on these monomers with butadiene showed some superiority over GR-S. In such cases larger amounts of the monomers should be synthesized in order to secure a more complete evaluation of the copolymers.

Sodium Polymerization

Although emulsion polymerization was used for the manufacture of GR-S, it was known that the Germans had investigated polymerization with sodium. The Russians, furthermore, were reportedly using sodium for the manufacture of synthetic rubber. It became of interest, therefore, to investigate this phase to determine if improved polymers could be obtained.

At the University of Illinois (77) work was conducted with sodium sand. The liquid monomers were treated with 0.35% of fine sodium and shaken at either 30 or 50° C. The reaction was complete in 10 to 15 hours, and the time was the same for either temperature. The polymers formed at 50° C., however, were softer and had a lower viscosity. The catalyst concentration could be varied over rather wide limits without affecting the rate of polymerization. Low concentrations of catalyst increased the viscosity and decreased the solubility of the polymer.

It was found that larger amounts of polymer could be prepared by the stepwise addition of monomers. Thus a large bottle was charged with a small quantity of butadiene containing the normal amount of sodium sand, e.g., 0.4-part. When polymerization of this portion was complete at 30° C., more monomer was added without additional catalyst, and the reaction was continued. Fresh monomer could be charged several times before a drop in rate of polymerization occurred. Although conversion was not quantitative in this procedure, better temperature regulation was obtained although the polymers were not wholly soluble.

The tendency of large batches to overheat and become insoluble can be overcome in another way. When polymerization at 30° C. has progressed far enough to make the contents of the bottle syrupy, the container is immersed in ice water until it is thoroughly chilled and is then left in a bucket of water at room temperature.

Rubber prepared by the above procedures is tough on the mill and difficult to process. The compounded and cured stocks do show a better balance between hysteresis and flex cracking resistance. Half and half tires made from experimental polymer, however, showed inferior wear to GR-S tires.

Kharasch (78) found that sodium hydride could be used for the polymerization of butadiene or butadiene and styrene. The polymers, however, were also tough and had a high gel content when no solvent was used in the polymerization.

Ligroin, ether, and dioxane were used as solvents, and the resulting polymers were then softer and contained less gel. Dioxane was found to be very satisfactory as a polymerization medium. It was also found that certain disulfides, such as diphenyl disulfide, di-n-propyl disulfide, dianisyldisulfide, and others, were good modifiers for the polymer. With 1% of sodium hydride and 0.1% dianisyl disulfide, reproduceable results were obtained. Conversions of 90% were obtained at 50° C. in two hours. These polymers were not evaluated in tires.

Vapor phase polymerization of butadiene was also investigated (79). Fine sodium was used as a catalyst in a bomb, and butadiene was allowed to distill in from a

cylinder connected to the bomb. Five-tenths of 1% of sodium based on the butadiene was used. The polymers produced were tough, contained high gel, and were difficult to process on the mill.

The polymerization was in general carried out at room temperature (25° C.). Increasing the temperature to 60° C. caused a slower rate of polymerization. Increasing amount of catalyst (larger surface) caused a more rapid rate of polymerization and softer polymers. In general, the reaction was complete in about 40 hours, using 1% Na catalyst.

A number of modifiers were found for the reaction. Ethyl chloride was the most powerful, followed in decreasing order by dimethylamine, acetaldehyde, and acetone. Concentrations of 0.2, 0.5, and 0.8% on the monomers were investigated. For any specific modifier, amounts between 0.2 and 0.8% produced no change in intrinsic viscosity. The most processable polymers, when compounded in a tread stock, did not show good physical properties and were therefore not evaluated in tires.

A unique type of polymerization based on a purely organic chemical approach to the subject was developed at M.I.T. (80). The reaction differs from the ordinary sodium condensation by which most sodium polymerizations proceed by being a truly catalytic one. The catalysts used are complexes that contain organo sodium compounds, e.g., sodium alkoxide and a sodium olefin.

The reaction, as conducted at M.I.T., uses pentane as a solvent with the aid of high-speed stirring. The polymer obtained from isoprene is pentane soluble. High-speed stirring is helpful in eliminating undesirable secondary reactions such as cross-linking. The reaction is generally very rapid and yields a high molecular weight polymer.

The intrinsic viscosity of the polymer is constant for any given catalyst and is independent of concentration of catalyst used. Catalysts that cause rapid polymerization give polymers that have high intrinsic viscosities.

Larger amounts of polyisoprene have been prepared with these complexes of organo sodium compounds and are being evaluated in tires.

Conclusion

After the selection of GR-S as the general-purpose synthetic rubber during World War II, the efforts of the government sponsored research program were directed toward the improvement of this rubber. When the cooperative program was initiated, very little was known about the impurities in the raw materials and their effect on the rate of polymerization and the quality of the rubber. The function of the modifier, the effect of gel in the polymer, and the necessity of short-stopping agent had not been thoroughly investigated. Methods for studying the structure of the polymer and its compositional relationships had not been developed.

A better understanding of these factors and how they affect the quality of the GR-S enabled the synthetic plants to produce an improved GR-S. The uniformity and quality of GR-S was steadily improved throughout the war and is still improving. Today GR-S is the equal to natural rubber for most purposes and for some uses is superior to the natural product.

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Pliolite Latex 190

(*Continued from page 744*)

15 parts more than double both the 300% modulus and the 500% modulus.

The tear resistance of the Chemigum latex is doubled, and the Shore hardness is increased about 25 points by the addition of 20 parts of the reinforcing latex. The permanent set increases; while there is a slight reduction in the water absorption.

Applications

Since Pliolite Latex 190 is an effective reinforcing agent for natural and synthetic rubber latices, it can be used generally for increasing the hardness, rigidity, and tear strength of latex compounds along with a slight or moderate increase in tensile without appreciably affecting the other properties. It has a light color and a low specific gravity, an additional advantage in many cases.

The resin latex may be used to improve the properties of latex compounds used in such items as molded toys and sports equipment, dipped goods, latex thread, paper impregnates, fabric coatings, latex foam, and wire and cable insulation.

Summary

Pliolite Latex 190 is a water dispersion of a resinous copolymer containing about 10 parts of butadiene and 90 parts of styrene. The latex is stabilized so that it can be easily handled and compounded with natural and synthetic rubber latices. It, in general, improves the tensile strength and increases the stiffness, hardness, and tear resistance of these latices with the addition of as little as 15 to 20 parts. These desirable properties along with its low water absorption and good aging qualities encourage its use in the fields of dipped goods, molded goods, textile and paper impregnates, latex foam, and wire insulation.

Acknowledgment

The authors wish to thank the various members of the Goodyear research and chemical products development division who aided in this work. The encouragement and suggestions of M. E. Wendt are gratefully acknowledged. The permission of The Goodyear Tire & Rubber Co. for publication of this paper is appreciated.

The Vulcanizing Characteristics of Reinforcing Furnace Carbon[1]

D. F. Cranor,[2] J. W. Snyder,[2] and A. G. Cobbe[2]

THE high quality of very fine furnace (VFF) carbon, as already developed for rubber compounding assures the future of this product. This fact is particularly evident in view of the efficiency of the manufacturing process and the present situation as regards the economics of natural gas.

The major differences in the compounding behavior of fully reinforcing furnace carbon and channel black are attributable to the fundamental differences in surface area, reticulate chain structure, and sludge pH. It is possible for the carbon manufacturer to modify surface and structure, and it is his problem to obtain the best possible balance between these properties. Surface and structure both favor good road wear in a tire tread, and structure in the proper degree promotes smooth processing. The development of these characteristics can be governed so as to produce reinforcement superior to that of channel black with GR-S, and fully equal in natural rubber. With good compounding, the processing properties of natural rubber and GR-S containing tread loadings of VFF carbon are satisfactory.

On the other hand a relatively fine furnace carbon can be produced which is coarse to the point where a very high structure factor is necessary for good abrasion resistance. The presence of this very great degree of structure, however, would lead to the possibility of processing difficulty in the form of scorching in compounds containing such a furnace carbon and also to performance defects such as cracking in rubber products made from them. Although the abrasion resistance might be good, the total combined effect of all these properties obviously would not represent a desirable balance.

The selection and the adjustment of the proportion of accelerator or combination of accelerators are the first points considered in meeting the faster curing characteristics of fine furnace carbon. In this connection the development of maximum quality is of first importance. Second is the matter of controlling low temperature or premature vulcanization, which is generally referred to as "scorch." In natural rubber treads this scorch problem is serious with the new fine furnace carbons, since the surface so closely approaches that of channel black; and the greater the surface area of a carbon, the greater is its stiffening effect on raw rubber stocks. While structure smooths extrusion, excessive structure produces an effect parallel to that of greater surface. Stocks become stiffer and develop more heat in processing.

With these considerations in mind the first thought might be that drastic accelerator reduction is indicated when the fast curing furnace carbons are used. It has been found, however, that excessive reduction leads to a condition which has been termed "accelerator starvation," since, when this occurs, quality is seriously impaired. The danger signals which indicate "accelerator starvation" are:

(a) Lethargy in modulus development. In other words—modulus does not build up with cure as it should with adequate accelerator. The stock is loggy and also is low in hardness.

(b) Lack of rebound. Fine furnace blacks should produce compounds showing higher rebound than similar channel black stocks. If this higher rebound does not develop, "accelerator starvation" should be suspected. As corollaries, there will be also high hysteresis and high heat build-up.

(c) Low tensile. In the case of deficiency in accelerator, tensile strength will be appreciably lower than it should be.

With the belief that if fundamental information on the vulcanizing behavior of very fine furnace carbon were available, it would do much to avoid the development of this condition of "accelerator starvation," we have studied the chemical as well as the physical curing effects of such carbons.

No problems are encountered in adjusting GR-S compounds containing VFF carbon for cure and processing. In view of this fact and the present-day trend which favors the use of natural rubber for tire treads, attention is focused on the vulcanizing effects in crude rubber. Furthermore no reference is made to mixtures of fine furnace with channel carbon in natural rubber. In such compounds processing and curing proceed in very much the same manner as in the case of straight channel black stocks. While numerous independent studies have been made with the aim of readjusting commercial tread compounds to develop the best all-round properties with a very fine furnace carbon such as Statex K, the work reported in this paper has been primarily directed toward determining the exact effect of systematic adjustment of a widely used accelerator employing several accepted means of estimating equivalent state of cure for such a series of compounds.

Experimental Details

A tread-type formula containing EPC black (Micronex W-9), which is a test compound that has been used for control work for a number of years, was employed as a basis for this work. It has the composition shown by Table 1.

TABLE 1. CONTROL COMPOUND # 1

Smoked sheets	100.
EPC Black	50.
Zinc oxide	3.
Pine tar	3.
Stearic acid	3.
Antioxidant	1.
Mercaptobenzothiazole	0.9
Sulfur	2.75
TOTAL	163.65

Compound #2—same except 50 PHR Statex K.
Compound #3—50 PHR Statex K, 0.7 MBT.
Compound #4—50 PHR Statex K, 0.5 MBT.

With this channel carbon formula containing 0.9 PHR of MBT as a control, a straight substitution of Statex K for EPC was made, leaving the accelerator unchanged in

[1] Presented before the Division of Rubber Chemistry, A. C. S., New York, N. Y., Sept. 19, 1947.
[2] Binney & Smith Co., 41 E. 42nd St., New York 17, N. Y.

Compound #2, but reducing the MBT to 0.7 in Compound #3 and to 0.5 in Compound #4.

Test slabs were cured at 274° F. through a range extending from 10 to 90 minutes. Stress-strain values were obtained and plotted, and tensile product was calculated. Also, hardness, rebound, and hysteresis were determined. T-50[3] tests were run, and total combined sulfur[4] and sulfur present as zinc sulfide[5] were determined according to recognized analytical procedures, and true coefficient of vulcanization was calculated, i.e., sulfur as zinc sulfide is deducted from total combined sulfur and the difference referred to the rubber content of the compound. Comparable cures were separately picked by three individuals having a background of practical rubber experience. At the same time all samples were inspected for sulfur bloom. The cures chosen as best on the basis of these means of appraisal were 45 minutes for the control, and 25, 34 and 43 minutes, respectively, for the Statex K-compound #2 containing the full amount of MBT, and #3 and #4 in which MBT was reduced to 0.7 and 0.5 PHR. Since it is understood that treads may be cured to a T-50 of —15° C., the standard selected is evidently on the underside of a full tire cure, but the other results still should be comparable.

Table 2 shows curing times selected *vs.* T-50 and true coefficient of vulcanization and also gives physical tests corresponding to the curing conditions selected on the basis of the T-50 and true coefficent of vulcanization results.

TABLE 2. CURE CRITERIA AND EFFECT OF MBT CONTENT ON PHYSICAL PROPERTIES

Control Compound #	1	2	3	4
Carbon black	EPC	Statex K	Statex K	Statex K
MBT	0.9	0.9	0.7	0.5
Cure at 274° F.-min.	45	25	34	43
T-50—°C.	−2.9	−3.0	−3.0	−2.5
T. C. V.*	1.87	1.65	1.89	1.80
Tensile p.s.i.	4200	4000	3950	3800
L-300 p.s.i.	1000	1275	1250	1200
L-500 p.s.i.	2500	2975	2850	2700
% elongation	690	625	630	645
Tensile product	290	250	248	245
Hardness, Shore	61	64	63	62
Rebound, Bashore	40	41	40	39
Torsional hysteresis	0.255	0.205	0.213	0.234

* True coefficient of vulcanization.

In comparing the four compounds, the outstanding points are that whereas EPC black produces slightly higher tensile, Statex K develops modulus to a greater extent. With equal acceleration Statex K shows higher hardness and also higher rebound with lower hysteresis. As acceleration is reduced, however, in the Statex K compounds, modulus is lowered, and hardness and rebound follow the same trend. With the #4 compound, in which MBT has been cut from 0.9 to 0.5, the effects of accelerator starvation are evident. Not only have tensile and modulus dropped, but rebound has also fallen off, and hysteresis has increased in comparison with the Statex K stocks which are more highly accelerated.

Since modulus is employed by some as a cure index, it is important perhaps to stress the fact that VFF carbon stocks exhibit higher modulus than similar channel black compounds at substantially equal state of cure. While this point is made clear by a study of Table 2 (at least insofar as Statex K is concerned), it has been thought worth while also to include test figures for a certain experimental furnace carbon which we are designating as "S Carbon" and which has a structure index[6] of 145 as against 125 for Statex K.

[3] Gibbons, Gerke, Tingey, *Rubber Chem. Tech.*, 6, 525 (1933).
[4] A.S.T.M. Method D-297-43T.
[5] Stevens, *Analyst*, 40, 275 (1915).
[6] Sweitzer, *Rubber Age*, (N. Y.), 55, 469 (1944).

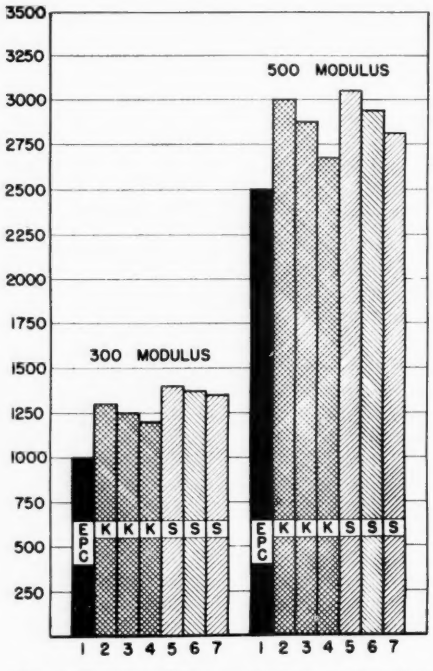

Fig. 1. Structure Effect on Modulus of Technical Cure

When this carbon of greater structure is substituted for Statex K in compounds such as those discussed, practically no difference in vulcanizing behavior is shown by T-50 and combined sulfur determinations. Inspection for bloom and selection of comparable cure by hand examination also lead to the conclusion that our Compounds #5, 6, and 7 (Table 3) which contain S Carbon with 0.9, 0.7, and 0.5 MBT, respectively, cure at the same rate as the corresponding formulae made up with the finer but lower structure Statex K. Figure 1 shows 300 and 500% modulus for all of these against Compounds # 2, 3, and 4 and also includes the No. 1 channel black control. Table 3 indicates that either Statex K or S Carbon stocks cured to give the same modulus as a channel carbon stock would be badly undercured as evidenced by the T-50 values.

TABLE 3. T-50 VALUES OF STOCKS CURED TO 1000 P.S.I. MODULUS AT 300%

Carbon Compound #	Carbon	Structure Index	MBT	Cure @ 274° F. – Min.	T-50 °C.
1	EPC	100	0.9	45	−2.9
2	Statex M	125	0.9	15	+5.0
3	Statex K	125	0.7	20	+4.8
4	Statex K	125	0.5	30	+3.0
5	S Carbon	145	0.9	15	+5.3
6	S Carbon	145	0.7	17	+6.0
7	S Carbon	145	0.5	25	+4.5

Up to this point we have demonstrated that cure with very fine furnace carbon is more rapid than with channel black.

Carbons of channel origin are characterized by an adsorptive activity which might be considered in compounding as removing a certain proportion of the accelerator from its proper sphere of activity. In the formulation of paints and inks the even finer channel carbons exert a profound action of this sort on toners and driers. Furthermore there is about 5% of so-called volatile matter attached to the surface of rubber channel black, and this is an acidic retarding agent which accounts for the lower pH in comparison with the pH of over 7 which is so characteristic of all furnace carbons.

Cure Mechanism

Armstrong, Little, and Doak[7] have shown a linear relation between modulus and the zinc sulfide found in an MBT formulation containing zinc soap. Hull, Olsen, and France[8] confirmed and extended this work and postulated a mechanism for the formation of disulfide bonds during vulcanization. The statement is made that the zinc sulfide formed during the vulcanization reaction in rubber, except for such as may result from secondary reactions during long cures, should serve as an index of the amount of disulfide cross-bonding.

In order to arrive at the true coefficient of vulcanization for selecting comparable cures it was necessary to determine the amount of zinc sulfide present in the compounds. There proved to be a noticeable difference between the zinc sulfide values for very fine furnace and channel carbon stocks. If we assume that the mechanism proposed by Hull, Olsen, and France is correct, then this variation in the amount of zinc sulfide formed would indicate a greater degree of disulfide cross-linking in the presence of very fine furnace carbon than with channel carbon. In order to examine this point more closely, a compound containing no carbon black (Compound #11) and a channel stock in which acceleration was advanced (Compound #8) were prepared and analyzed for zinc sulfide. Assuming that one molecule of zinc sulfide was formed for every disulfide linkage, we calculate the "millimols of disulfide cross-linkage" per 100 grams of rubber. The data are shown in Table 4.

Table 4. Effect of Carbon Black on Cure Mechanism

Compound #	Carbon Black	MBT	Cure 274° F. – Min.	"Millimols Cross-Linkage" per 100 Grams Rubber
1	EPC.....	0.9	45	6.1
2	Statex K.....	0.9	25	8.2
3	Statex K.....	0.7	34	8.8
4	Statex K.....	0.5	43	8.9
11	None (pure gum)...	0.9	25	8.0
8	EPC.....	1.1	40	5.6

The "millimols of disulfide cross-linkage" for the gum stock #11 which had a T.C.V. of 1.71 was of the same order as for the Statex K compound #2 which had a T.C.V. of 1.65 and showed that the presence of Statex K actually did not increase the formation of disulfide cross-linkages, but that channel carbon retards their formation.

We have no explanation at this time to offer for the apparent contradiction of data presented by Hull, Olsen, and France. In their work it was concluded that "Carbon black retards the cure of the MBT stock, but has little effect on the ratio of zinc sulfide to total sulfur." According to their findings Compound #11 should be in the same range of zinc sulfide content as the channel Compounds # 1 and 8. Pending further investigation it appears that there may be a relation between the pH of the rubber matrix and the degree of cross-bonding aside from any accelerator effect.

Practical Compounding

Our more recent compounding research studies have centered on lower sulfur ratios. With the VFF carbon such formulations develop excellent physical properties, but reduction of sulfur to a point close to the minimum necessary for full cure shows only slight slowing of the rate of vulcanization as judged by combined sulfur.

In compound #10 (Table 5) which contains 2.25 PHR of sulfur, true coefficient of vulcanization is 1.60 at a 30-minute cure, against 1.65 at a 25-minute cure for the otherwise identical Statex K compound which contains 2.75 PHR of sulfur, Compound #2. Therefore it is clear that a retardant must be employed if the accelerator proportion is not to be altered considerably. Rosin has been taken as a material which has a positive and well-recognized retarding effect, and rosin functions as a retarder throughout the full course of the cure. This is not the case with certain other materials which have been advanced as scorch inhibiters.

Table 5. Effect of Sulfur on Statex K Cure

Compound #	1	2	10	15
Carbon black	EPC	Statex K	Statex K	Statex K
Softener	Pine tar	Pine tar	Pine tar	Rosin
MBT	0.9	0.9	0.9	0.9
Sulfur	2.75	2.75	2.25	2.25
Antioxidant	1.00	1.00	1.00	2.00
Cure @ 274° F.—min.	45	25	30	40
T. C. V.	1.87	1.65	1.60	1.72
300% modulus p.s.i.	1000	1275	1370	1450
Tensile p.s.i.	4200	4000	4100	4150
Elongation	690	625	650	630
Tensile product	290	250	266	[262

When rosin is added and pine tar still retained in the compound, we obtain a true coefficient of vulcanization of 1.66 corresponding to the 40-minute cure; so there is strong evidence of retardation. Since a combination of three parts each of rosin and pine tar deteriorates physicals, the next step consisted of a direct substitution of rosin for pine tar with adjustment of antioxidant upward from 1 to 2. Stress-strain figures and T.C.V. for such compound, referred to as #15, are shown in Table 5 so as to afford comparison with the channel carbon control and with the Statex K compounds #2 and 10.

It is to be noted that the tensile and modulus development in the #15 low sulfur compound are distinctly superior.

Present indications are that the ultra-fine furnace carbon, Statex K, produces full reinforcement at a low sulfur level when accelerator is held at proportions approximating that required for EPC. On the other hand, we are forced to depreciate an approach which involves retention of the sulfur normal for channel black and any drastic reduction of accelerator.

Summary and Conclusions

A study on the vulcanizing effect of very fine furnace carbon (Statex K) in tread-type compounds with MBT as the accelerator in the presence of zinc oxide and free fatty acid has been started. Comparison is made with the behavior of a channel carbon control and with a non-pigmented stock of similar acceleration.

The following conclusions have been made:

(1) With equal MBT acceleration a fine furnace carbon compound vulcanizes in about half the time required to cure a tread compound containing channel carbon of the EPC type.

(2) Accelerator reduction impairs physicals, and when this is carried to a point where rate of cure is approximately the same, clear indications of "accelerator starvation" are evident.

(3) If it is assumed that T-50 and true coefficient of vulcanization are reliable criteria, modulus cannot be considered as a cure index when compounds containing carbons of differing degrees of reticulate chain structure (a symmetry of particle aggregates) are compared.

(4) In the presence of Statex K, cure proceeds as in a mix containing no carbon and at approximately the same rate. There is no evidence from our work that Statex K has an accelerating effect although, as stated

(*Continued on page 797*)

[7] *Rubber Chem. Tech.*, 17, 788 (1944).
[8] *Ibid.*, 20, 649 (1947).

EDITORIALS

The Need of Caution

ALTHOUGH management in the rubber goods industry is generally optimistic for a continuing high level of production and sales during 1948, happenings during February indicate a need of caution in planning activities during the latter part of the year. The world food and agricultural situation shows definite signs of improvement, and with the pressure of public opinion in the United States directed against too much support of food and agricultural prices by the government at the expense of the consumer, commodity prices have turned downward.

The drop in commodity prices is considered to be beneficial to the country as a whole and was overdue anyway. According to the existing "parity price support" law, such prices cannot drop below a certain fixed minimum, but any reduction approaching that minimum aids the average American family because it leaves a little more income for other purchases. Of course it does put a squeeze on the farmer by reducing his income while the prices for industrial products that he must buy have not been reduced an equivalent amount. Farm income, however, is not likely to drop too much by virtue of the above-mentioned support of the price of farm products by the government and the need of these products for European relief for the next several years.

What about the outlook for the manufacturing industries and the cost, income, profit relation here? In the rubber industry there has been a recent slackening of the demand for tires and for soles and heels. This lull is considered temporary, and the output for the year in these lines is expected to be only slightly less than for 1947 and, in any event, still considerably better than for any prewar year. Other branches of the rubber industry do not seem to be experiencing even a temporary decline in the demand for their products as mechanical goods, footwear, coated fabrics, and other rubber goods manufacturers report substantial backlogs of orders.

Costs in the manufacturing industries based on each dollar of sales received were reviewed in a recent talk by Harvey S. Firestone, Jr., chairman of the board, Firestone Tire & Rubber Co. Forty-seven cents go for materials and supplies, of which 35¢ to 45¢ go to the workers who produce those materials. Nine cents go for taxes, of which 4¢ are paid to government employes. Six cents go for depreciation, maintenance, repairs, and interest; 2¢ for advertising, and 1¢ for research. This distribution leaves 35¢ from the sales dollar, of which the employes get 29¢. The remaining 6¢ are profit, of which 3¢ are set aside for tomorrow's jobs by reserves to buy new machines and to expand plants. The remaining 3¢ are paid to stockholders, who are the owners of the machines, tools, and the factory buildings. All told, approximately 85¢ out of every dollar of sales by manufacturers go for salaries and wages, Mr. Firestone said.

At the present time the rubber goods manufacturing industry, which, according to a study of hourly and weekly earnings of 29 manufacturing industries made by the National Industrial Conference Board, Inc., ranks fifth in amounts earned in October, 1947, is faced with a demand from the United Rubber Workers of America, CIO, union for an increase of 30¢ an hour in the wage rate. The average hourly and weekly earnings of rubber workers for this period were $1.56 and $61.28, respectively. The impact of an added 30¢-an-hour increase or any significant portion thereof on the proportion of the sales dollar paid for wages and the effect on the amounts left for the remaining charges would obviously be very great. The consequences of such action would be disastrous to the industry and the workers themselves. Profit, reserve funds, repairs and maintenance, research, etc., would have to be drastically reduced, or the sales price of the products made, raised. Economists are generally agreed that any further appreciable increases in the prices of necessary consumer goods will result in an appreciable drop in sales.

As the country faces the possibility of a "third round" of wage increases and tries to estimate the effect of the recent drop in commodity prices, there is evidence of the growing need of caution in planning operations for the remainder of the year 1948, and in this, it might be added, organized labor and industrial management are or should be equally concerned. If industrial management will limit its profits while the farmer by force of circumstances has to accept a reduction in his, and if organized labor will limit its demands to the correction of inequities rather than concentrating on the achievement of special benefits at this time, the readjustment of prices, costs, and profits, when it does come, may be moderate, and the burden more equally distributed among all concerned.

In addition, and possibly overshadowing all other considerations, is the necessity of keeping America strong economically if most of the world is ever to achieve rehabilitation and reconstruction and an equivalent degree of economic strength. It is still not clear just how much or for how long the European Recovery Program will be a factor in the American economy, but the ERP and the countries included in it will suffer a very serious setback if a business recession of major proportions is allowed to develop in the United States. It is generally agreed that there are two major factors to be considered in deciding the extent to which the United States should be responsible for ERP and for how long. The first is a matter of relieving actual starvation, and the second is the maintenance of the position of this country as a major world power. The year 1948 will call for statesmanship not only in the executive and legislative branches of the government of the United States and the governments of the countries in the ERP, but also in the managements of industry and labor in all of these countries if the world is to achieve and maintain peace and prosperity.

Plastics Technology

Injection Cylinder Design[1]

D. J. Sloane[2]

IT IS common knowledge in the molding industry that the effectiveness of the injection cylinder of an injection molding machine determines the productivity of the machine. Every other feature of the machine is of secondary importance to this single unit.

Design Requirements

This effectiveness depends upon the design features of the cylinders, and the goal of any injection cylinder designer is to achieve the following:

(1) To plasticize and prepare the rated capacity of the cylinder (figured in styrene) in the mimimum time it takes to set up that amount in a die.

(2) To deliver effective pressure from the plunger to the die with minimum pressure losses in the cylinder.

(3) To control cylinder temperatures within a few degrees, avoiding hot or cold spots, heat lag, and inaccurate readings.

(4) To use a minimum material inventory and maximum efficiency of heat transfer to prevent degrading material by too long a stay in the cylinder, and to reduce material loss at purging. The cylinder should be effective with all thermoplastics.

(5) To streamline the cylinder as to surface finish, contour and hydraulic balance so as to permit ease of purging and prevent trapping of gases.

(6) To specify tough, dense, abrasion resistant, and high heat conducting metals.

(7) To space openings and joints and to support the cylinder in such a way as to minimize the number of parts and prevent leakage and contamination.

(8) To avoid small metal sections too easily subject to fatigue and breakage and to avoid slots and holes which clog and restrict flow.

(9) To make the cylinder easy to take apart and clean without injuring any surfaces.

(10) To employ heaters which have mechanical strength and long life and which are easily accessible for replacement.

(11) To build a design equally effective on large as well as small machines.

(12) To build a design which is original and yet reasonably inexpensive.

Previous Designs

In the past, designs have progressed through a great many phases, and in hindsight it can be seen that some ignored factors which today are obvious and generally understood to be indispensable.

In the earliest machines separate pineapples were used, tapered in different ways and spaced from the cylinder bores with legs to permit material passage. Experience showed this construction to be troublesome. The ring always expanded away from the plug under heat, leaving loose spreaders liable to contamination.

Since that time most commercial designs have progressed to a spreader arrangement

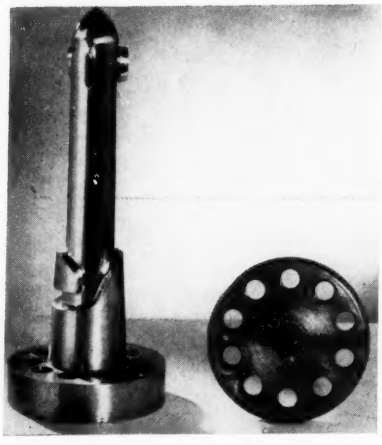

Fig. 1. Spreader for Injection Cylinder

in which a hub or torpedo is connected integrally with the cylinder wall through metal ribs or supports; or a torpedo is connected integrally with a cylindrical ring insert fitted to the cylinder wall. In these designs the material is extruded in small sections through holes or slots between torpedo and cylinder wall. The metal sections are generally weak, and the holes are subject to clogging and unbalance.

Heat is applied from the outside periphery of the cylinder by means of resistance jacket heaters. In earlier times the idea of heating the torpedo directly was used, but in almost every case this arrangement was abandoned because of the difficulty of replacing the internal heater and because no important advantages were apparently effected.

New Design

The most recent and novel answer of our company to the problem of injection cylinder design has again been built around the idea of independently heating the spreader or torpedo (Figure 1). This design has shown itself in practice to be quite effective as a heat exchange and injection unit. The unit depends for success on the fact that the temperature of the spreader is controlled within a few degrees, independent of the cylinder wall temperature.

As a result of this independent external heat, the spreader is entirely out of contact with the cylinder wall in the plasticizing zone. The path of the plastic material is an annular ring, and all the plastic material passes within 3/16-inch of an actively heated surface. In contrast to conventional spreaders, this one is no longer the low point of a head gradient that originates at the outer surface of the cylinder. It no longer is in a heat shadow or thermal vacuum which, instead of heating the material, is more often itself heated by the plastic material.

The assembly drawing of the spreader (Figure 2) illustrates the principles of design to which investigation and experiment led. The most serious obstacles to success were placing the spreader thermocouple for accurate control, designing a heater which would stand up under totally enclosed operation, finding a compromise which would reduce material restrictions without sacrificing plasticizing capacity, and sealing the spreader in the body against

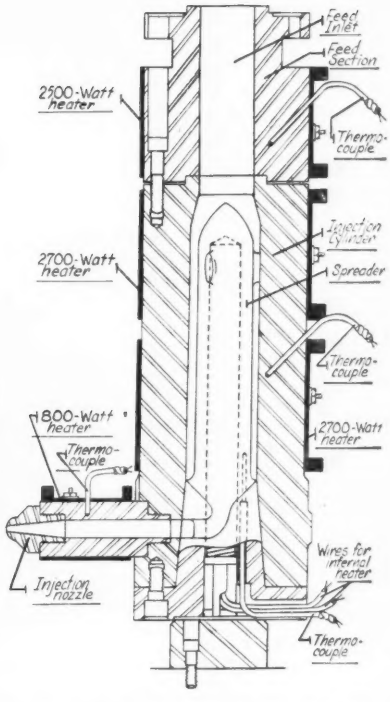

Fig. 2. Cross-Sectional Drawing of Injection Cylinder Assembly Showing Heaters and Thermocouples

leakage. In the final design shown each of these difficulties has been resolved.

Performance of New Design

In practice this new design has shown the following characteristics in answer to the design requirements listed earlier.

(1) Increased plasticizing rate for any given inventory of material because it heats the plastic from the inside as well as the outside.

(2) Increased effective pressure in the die because of a totally unrestricted material passage, a hot spreader, and a warm feed section which permits easier passage of the material over the tip of the spreader.

(3) Accurate temperature control of both the spreader and the cylinder body in three zones by use of pyrometers.

(4) The metal surfaces exposed to molten plastic are all ground, hand polished to a die-like finish, and chrome plated for protection against corrosion. The streamline and flow characteristics have all been established by experiment to give easy clean-out, as do the heated spreader and the absence of dividing fins. The vertical injection assembly and absence of severe divergence in the cylinder permits escape of gas upward and consequently gives good general-purpose characteristics to the cylinder.

(5) The specifications call for tough and dense metals, and the design has eliminated all holes, slots, and thin metal members to avoid fractures and distortions. The nozzle extension, spreader, and spreader body are of Hy-Ten-Oxy-B3X steel, with chrome plating on surfaces exposed to plastic. The cylinder top is of S.A.E. 4615 steel with the inside bore carburized and hardened to Rockwell C-60.

(6) The joint arrangements are such that no screw-held transverse joints, liable to stretching and opening, are in the plasticizing zone. The joint between the feed section and cylinder body is in a semi-

[1] Presented before Chicago Section, Society of Plastics Engineers, Inc., Nov. 4, 1947.

[2] Lester Engineering Co., 2711 Church Ave., Cleveland 13, O.

plastic zone. The joint between spreader and cylinder body is a shrink fit and taper to prevent separation. The spreader base is seated against the machine frame in order to prevent separation under the injection pressure.

(7) Because of the tapered fit between spreader and cylinder body, the cylinder is relatively easy to disassemble and is especially easy to clean.

(8) By virtue of the vertical injection assembly of the machine for which this cylinder was developed, the internal heater is equally as accessible for replacement as the external resistance heaters.

(9) In conventional designs of larger capacities the spreader is even more remote from the heat source than in smaller machines. The effectiveness of internal heating is therefore even more apparent in larger equipment.

The new design has been tested on all thermoplastics and has given high production rates and good-quality casting in all cases. This design is an effective answer to the problem of injection molding.

S.P.E. National Conference: Section Meetings

THE fourth National Conference of the Society of Plastics Engineers, Inc., was held on January 21 to 23 at the Rackham Memorial Building, Detroit, Mich. A registration of 360 persons, of whom 267 were members of the Society, attended the three-day meeting, which featured morning technical sessions and informal afternoon conferences at the 23 booths set up by participating companies.

In place of the conventional show formerly held by the Society for the benefit of the general public as well as industry, attendance at this year's meeting and conferences was limited only to members of the industry. This innovation met with a generally favorable reaction from the exhibitors, particularly the material suppliers.

At the annual meeting on January 22, new national officers of the Society were elected, as follows: president, J. H. DuBois, Shaw Insulator Co.; vice president, Mario Petretti, Noma Electric Corp.; secretary, R. G. Dailey, Wolverine Plastics; and treasurer, R. B. Bishop, Socony-Vacuum Oil Corp. William Schack, of *Plastics* magazine, was appointed national publicity chairman, and M. Scott Moulton, B. F. Goodrich Chemical Co., was named chairman of the national publications committee.

Other features of the meeting included an open forum on plastics in the automotive and refrigeration industries on January 22, and daily afternoon showings of industrial motion pictures dealing with the plastics industry.

Seventeen papers were presented at the three morning technical sessions, held under the chairmanship of Carl J. Frosch, Bell Telephone Laboratories, Gunnar Lindh, Udylite Corp., and L. E. Cheyney, Battelle Memorial Institute, respectively. In addition the three winning papers in the Society's national prize paper contest were presented on January 23. Abstracts of the technical papers are given below.

Plastics in the Automotive Industry. Plastics have been used for more than 25 years in the automobile industry. In 1942 about 100 plastic parts, having a combined weight of five pounds, were used in the average automobile. This use was much the same during 1947 and is also expected to be similar in 1948. Some types of plastics have replaced others and competition is developing. Prospects are bullish for plastics in the automobile industry, particularly for vinyls, polystyrenes, nylon and other upholstery plastics, plastic envelopes for stamping, and certain laminates to replace some steel parts. W. M. Phillips and A. C. Nixon, General Motors Corp., Detroit.

Stretch Orientation of Polystyrene and Its Interesting Results. Stretching produces the greatest strength in the direction of stretch and is useful only in monofilaments. Wide sheets require bilateral stretch; while injection moldings necessitate careful die design. Compression molding may produce sheets with either bilateral or unilateral orientation. The long relaxation time of stretched sheets permits lamination without serious loss of strength and toughness. The results obtained with different types and techniques of stretching are given, as are also the results of a polariscopic study of strains. James Bailey, Plax Corp., Hartford, Conn.

Design and Finish Requirements on Molds for the Production of Plastic Lenses. In the past lens molds have been made by hobbing to give greatest accuracy and highest finish. An alternative method of designing lens molds is suggested which permits the use of optical methods in finishing the lens surfaces by means of inexpensive inserts. The reflectivity and surface finish of the mold insert surfaces are also discussed in relation to their effect on the plastic lens surface. E. J. Marslek, Acme Scientific Co., Chicago, Ill.

Plasticizers in the Plastics Industry. By proper selection and use of plasticizers many properties of the finished plastic may be varied widely, including hardness, flexibility, impact strength, resilience, electrical properties, aging behavior, and permeability. Recent developments include the new flame-resistant materials, applications of polymeric materials as plasticizers, and the perfection of the paste technique of fabricating vinyl plastics. L. E. Cheyney.

Styrene Polymers and Copolymers for Industry. Advances have been made in providing the plastics industry with polystyrene polymers and copolymers having greater versatility and wider fields of application because of improved properties. The economic foundation for these developments is stressed, and the competitive aspects for other materials are emphasized. The advances are summarized, and each product is discussed from the standpoint of its outstanding property. Actual and potential applications of these newer materials are indicated. R. G. Fordyce, Monsanto Chemical Co., Springfield, Mass.

The Consumer Looks for Quality. Shortage of goods during the last two years has resulted in a seller's market, but now with a buyer's market in prospect more attention will have to be given to what is wanted. Engineers must design and produce products that will satisfy these wants while achieving economic control of quality. Pertinent engineering developments in this field are reviewed, and a method is outlined to attain such control of quality. P. S. Olmstead, Bell Telephone Laboratories, Murray Hill, N. J.

The Production Economics of Press Design. High-speed methods of molding, made possible by electronic or steam preheating, have so shortened curing time that the operating portion of the cycle is becoming the remaining target for output improvement and labor reduction. Controlled high-speed press operation and automatic cycle timing and control offer present opportunities for improvement. The cost of material conversion is analyzed and charted by its components, and the investment value of cycle time savings is indicated. H. M. Richardson, DeBell & Richardson, Inc., Springfield, Mass.

Present Developments in Steam Preheating of Phenolic Materials. Another year of practical experience with steam preheating has proved the practicability of this method for general transfer molding. Moisture content of the preheated preforms can now be more readily controlled. Interesting data on the rate of softening of preforms in a steam preheating atmosphere have been accumulated by the use of a penetrometer and show the great influence of very small amounts of moisture. S. K. Moxness and J. Formo, Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Industrial Uses for Nylon. Nylon is becoming increasingly important as an industrial plastic. The different formulations available are described, and the modifications necessary to mold or extrude nylon in conventional equipment are discussed. The different applications for industrial nylons are reviewed, and reference is made to future possibilities for nylon materials. The chemistry of the nylon is not discussed, and new products are described only generally. J. E. Teagarden, E. I. du Pont de Nemours & Co., Inc., Arlington, N. J.

The Theory of Colorimetry and Its Application to Color Standardization. The spectrophotometric curve, besides being an extremely rapid analytical tool, may also be used as a color standard. From both the spectrophotometric curve and the I.C.I. system of color notation it is possible to make color matches without using an actual standard. As in the case of visual matches, it is also possible to determine how the match will differ with a change in the color of the illuminating light. Dorothy Dolton, Interchemical Corp., New York, N. Y.

Methods for Industrial Color Standardization. The best instrumentation available today cannot do the job of cataloging irrefutably the 18 million colors which are possible. The language of color alone will require concession and cooperation from the three groups who deal in basic color: chemists, physicists, and psychologists. The spectrophotometer, glossmeter, and light booth will lead to many of the answers to the color problem. P. M. Koons, National Cash Register Co., Dayton, O.

Mycalex-410, Glass Bonded Mica in Molded Form. Although a ceramic consisting of finely divided mica dispersed in a glass binder, Mycalex-410 is molded by equipment and methods similar to those used in transfer molding of phenolics. It may be molded with precision and is adapted to the inclusion of metal inserts. Designs are discussed. F. L. Yerzley, Mycalex Corp. of America, New York, N. Y.

Fabricating of Heat Resistant Plexiglas. Plexiglas II offers the clarity and good physical properties of the regular grade plus a markedly higher resistance to heat. Many of the fabricating techniques used with standard Plexiglas are equally satisfactory with the heat resistant grade except in cementing and forming. Cement-

ing requires a special cement; while forming requires ovens operating at about 20° C. higher than for standard Plexiglas. Examples of the fabricating techniques used in several fields are discussed in detail. O. L. Pierson, Rohm & Haas Co., Philadelphia, Pa.

A New Attack on the Degradation of Plastics. The logical method of attack on this problem and the only one which will yield an entirely satisfactory solution is to determine the specific chemical reactions involved in the degradation of the plastic and how these reactions are affected by the intensity of the weathering conditions encountered. The Bureau of Standards is conducting such a program, using controlled conditions of heat, humidity, ultraviolet radiation, and ambient atmospheres. The changes in plastic structure upon aging are determined by ultra-violet absorption, infrared absorption, X-ray diffraction, electron microscope, electron diffraction, and dielectric absorption. F. W. Reinhart, National Bureau of Standards, Washington, D. C.

Stress-Time Relations in Plastics. Some of the classical theories for the behavior of visco-elastic materials as functions of time are reviewed. Equipment is described which has been developed to provide control over rates of crosshead, rates of load application, and rates of strain. A few typical stress-time curves and relations for different plastics, obtained under various rates of load and strain, are presented and discussed. A. H. Dietz, Massachusetts Institute of Technology, Cambridge, Mass.

Durez Phenolic Resins in Synthetic and Natural Rubber. Specifically formulated Durez phenolic resins are new and unique materials for rubber compounding and solvent-type adhesives. In rubber the resins act as plasticizers and also give improved properties; while in rubber-base adhesives they increase adhesion, toughness, tack, and heat resistance. Rubber is being used experimentally to modify and impart desirable properties to phenolic molding compounds. Combinations of phenolic resin emulsions and latex are being evaluated commercially for use in pretreating rayon cords to improve adhesion in tire manufacturing. Jay Searer, Durez Plastics & Chemicals, Inc., N. Tonawanda, N. Y.

Some Recent Phases of Fabricating Technique. The greater use of heavy sections and the demand for finer detail have posed new problems of heating and forming heavy sections. Equipment has been improved to accomplish the better control needed. Methods of determining in advance the thickness of the flat sheet required to produce a finished article within minimum design specifications are necessary. No general formula exists here, but an estimate can be made. J. W. Knight, Fabri-Form Co., Byesville, O.

Davis Discusses Molded Part Design

The Cleveland-Akron Section, held a regular dinner-meeting on January 30 in Akron, O. Speakers were Carl E. Synder, Case Institute of Technology, and R. L. Davis, Fabri-Form Co. Mr. Synder presented a summary of his paper, "Coumarone-Indene Resin," which won the Section's portion of the S.P.E. prize paper contest for 1947.

Mr. Davis spoke on "Fundamentals of Molded Part Design." The designer of a plastic part must be familiar with the materials and what happens to them during molding or fabrication; the molding or fabricating machines; the machine tools used in making the molds or forms; and the finishing operations used in making the parts acceptable to the customer's inspection. In the designing of any plastic part a logical sequence should be used in approaching and working out the design, as follows: (1) study the application thoroughly; (2) select either one or a group of materials that will suit the application; (3) select an economical method of molding or fabricating the material; (4) make the detailed design covering length of cored holes, location of parting lines, location of inserts, proper design of threads, etc.; and (5) make any changes in material that may be necessary in view of the detailed design. Mr. Davis took a typical application and discussed its design following the steps outlined above.

Sasso before Chicago Section

The Chicago Section, S.P.E., held a meeting February 3 in the Merchants & Manufacturers Club, Chicago, Ill. Speaker of the evening was John Sasso, production editor of *Business Week*, whose topic was "What's Ahead for Plastics in 1948." At the beginning of the meeting it was announced that L. H. Armine, Imperial Molded Products Co., would be the Section's representative on the Society's national board of directors.

Mr. Sasso's theme was that the future of the plastics industry rests with the industry itself. The industry has now come of age, and its fate will be what its members want to make it. Unfortunately the postwar period with its problems of supplies and labor forced some manufacturers to flirt with improper applications of plastic materials, the speaker said. The trend is now back to realism and a better and healthier approach to the industry's problems. Mr. Sasso also considered the need of education in the plastics industry and emphasized the need of educating the engineer in the companies which buy plastics, in addition to educating the public. For 1948, Mr. Sasso predicted a better supply situation and higher production, with a demand for finished products still not completely satisfied. The plastics engineer can be most useful in such a period by doing a better and more efficient designing job and by fitting the material to its proper application.

Stahl Addresses Newark Section

Approximately 65 members and guests attended a regular dinner-meeting of the Newark (N. J.) Section, on February 11 at the Newark Athletic Club. A short business meeting was held after the dinner, at which J. H. DuBois, Shaw Insulator Co., the newly elected S.P.E. president, spoke briefly on the Society's activities. The national directors are to meet in New York on March 5, Mr. DuBois said, to investigate a plan to clarify and reevaluate membership requirements. This plan would also give full voting rights to associate members and permit them to hold office. Other items on the agenda are proposals for the Society to establish professional grade memberships for those having 10 years of plastics engineering experience, and pioneer memberships for those having 25 years' experience.

James T. Growley, of Celanese Plastics Corp., the Newark Section's new president, announced that all the presidents of the local technical councils would be guests of the Section at its next meeting on March 10. William J. Sparks, Esso Laboratories, is scheduled to address the gathering. Program Chairman John Currier, Bakelite Corp., announced that the April 14 meeting would be held in combination with the New York Section. Mario Petretti, Noma Electric Corp., will speak on thermosetting plastics for small-cavity molds.

Following the business meeting, Gerald Stahl, industrial designer of New York, spoke on "Engineering in Industrial Designing." The principle of obsolescence is the stimulus for industrial design, he said. European products are designed to give long service lives; while American designs are based on relatively early obsolescence because of assembly-line production methods and the need of a continuing high demand. The factors taken into account in the designing of new or improved products include research on client's and competitors' products, market demands and needs, production cost, functional efficiency of the product, and consumer acceptance. In addition, proper designing also involves intangible factors of the esthetic type, such as taste and psychological appeal. These factors depend on form, texture, color, weight, and the psychology of previous consumer acceptance to determine how much of a change the public will accept. To correlate these engineering and esthetic factors into a proper design requires understanding and cooperation between the designer and the manufacturer.

"With such understanding, there are very few products on the market that cannot be improved," Mr. Stahl stated.

In the discussion period following his talk, Mr. Stahl noted that although the first demand of an inventor is for stylizing of his products, a good industrial designer considers styling as the last step after checking on the functional efficiency of a product.

The 1948 officers of the Newark Section are as follows: president, Mr. Growley; vice president, Harold E. Frutchey; and secretary-treasurer, Edward B. Soules, Detroit Mold Engineering Co.

Cameron Addresses New York Section

The New York Section met at a regular dinner-meeting February 10 in the Sheraton Hotel, New York, N. Y. Approximately 48 members and guests heard H. J. Cameron, sales manager of W. T. LaRose & Associates, Inc., speak on "Dielectric Heating as It Applies to the Plastics and Allied Industries."

A high-frequency generator is in essence an electrical transformer having a special holder or support for the product being heated. Several versions of transformers are available to deliver either constant voltage, constant current, or constant power. A constant voltage transformer gives an increasing rate of temperature rise during heating; a constant current transformer gives a decreasing rate of temperature rise during heating; and a constant power transformer gives a linear temperature rise with time. The method of loading varies between continuous and intermittent, depending on the product being heated, and the use of pressure, while heating, can sometimes be effectively employed. By distorting the electrical field and by changing pressures it is possible to place the most heat where it is most needed.

Mr. Cameron then discussed applications of dielectric heating in the plastics industry, covering the following points: (1) preformed thermosetting plastics; (2) laminating thermosetting plastics, especially phenolic sheets one inch or more in thickness; (3) post-forming of laminates, where dielectric heating gives dimensional stability; (4) injection molding, while technically feasible, is relatively expensive and may not sufficiently remove water con-

tent; further development work is needed; (5) the problem of replacing an injection cylinder torpedo with a dielectric heater is one of design and requires extensive development work; and (6) the use of dielectric heat for welding rigid and flexible plastics is of interest, especially for heavy sheets and injection moldings, but poses the problem of properly holding the heated parts during the relatively long cooling period.

Applications of high-frequency heating in the rubber industry may be even greater in scope than in the plastics industry, Mr. Cameron declared. Shoe sole and heel stocks compounded with phenolic resins have been cured by this method in 10 seconds for thin sheets and 30 seconds for thick sheets. The gelling and the curing of latex foam are also being done with dielectric heating. The speaker also discussed applications of dielectric heating in other fields, including resin-bonded abrasive wheels and the bonding of wood with resin glues. The talk was illustrated by samples of product applications and photographs of machines and heating methods.

At the business meeting Past President David Murray, Boonton Molding Co., introduced the new president of the Section, Arthur Nufer, Bakelite Corp. Mr. Nufer in turn introduced the other new officers of the group, elected at a meeting of the board of directors on January 27. The other new officers are: vice president, Stanley Bindeman, Noma Electric Corp.; treasurer, George Rice, American Cyanamid Corp.; and secretary, Sam Silberkraus, Regal Molding Corp. New committee chairmen follow: publicity, William Schack, *Plastics;* program, Mr. Bindeman; house, George Baron, Ideal Plastics Corp.; and membership, R. N. Boucher, Bakelite. Other members of the Section's board of directors, in addition to the officers, are W. C. Peterson, Ideal Plastics, Robert Brinkema, Egmont Arens, L. J. Francisco, Formica Insulation Co., and Vincent Sagesse, plastics consultant. The Section's next meeting will be held on March 9 at the Sheraton Hotel.

Molding Vinylite and Polyethylene

The Rhode Island & Southeast Massachusetts Section convened February 11 at its regular meeting place, the Providence Engineering Society Bldg., Providence, R. I. Some 40 members and guests attended the meeting, which featured a talk by John K. Honish, Bakelite Corp., on "Molding of Vinylite and Polyethylene," illustrated by samples of various products.

Mr. Honish's talk was divided into three parts, covering the rigid vinyl resins, the non-rigid vinyl resins, and polyethylene. The rigid vinyls are copolymers containing 85-88% vinyl chloride and 15-12% vinyl acetate. These plastics have outstanding chemical resistance, the lowest mold shrinkage of any thermoplastic, and the highest flex modulus in the order of 350,000 to 400,000 p.s.i. This material is used extensively in high-fidelity phonograph records, and the speaker predicted further expansion in this field of application. Disadvantages of the rigid material are that very high pressures are necessary, and the strain release temperature of 140-150° F. is too marginal.

The non-rigid vinyls contain 93-95% vinyl chloride, the remainder being vinyl acetate, and offer direct competition to rubber products. Of the 100 million pounds currently being consumed per year, 70% is used in wire and cable insulation and the remaining 30% in gaskets, washers, and other small parts. Mr. Honish gave tips on molding non-rigid vinyls, including use of chromium plated injection cylinder; proper mold design and use to prevent "thermal misuse"; plug flow in the mold, rather than turbulent flow, is a must; avoidance of pressure changes; and use of correct molding temperatures (300-380° F.) to give maximum gloss. The speaker also exhibited some products made from Plastisols (vinyl resin dispersions in plasticizer) by a process similar to the Kaysam process for latex.

The polyethylene resins offer a hardness range from the consistency of cold cream to a horny rigidity by molecular weight control. The polymer of greatest commercial interest has a softening grade of about 108-115° C. This material has excellent chemical stability and electrical properties and can be used for handling hydrofluoric acid. It has found application in flexible tumblers, ice cube molds and trays, and a wide variety of bottle closures.

Palinchak and Mack Guest Speakers

Approximately 36 members and guests attended a dinner-meeting of the Central Ohio Section on February 12 at Moundbilders Country Club, Newark, O. Stephen Palinchak, of Battelle Memorial Institute, spoke on "A Novel Method of Fabricating Flexible Vinyl Materials," and Gordon C. Mack, patent attorney of Akron, discussed "Patents."

Dr. Palinchak's talk was a description of the method employed for fabricating Vinylite facepieces for the Army's T-45 microphone. This method was a combination of dipping and molding procedures. Mr. Mack's talk covered the general procedure for obtaining a patent and the practical value of a patent once obtained. After the talks, a drawing was held for door prizes consisting of three boxes containing miscellaneous plastic household articles donated by Columbus Plastic Products, Inc.

Silicone Polymers and Petroleum for Resins

The Philadelphia (Pa.) Section, held a dinner meeting February 18 at its regular meeting place, the Franklin Institute. Speakers were T. F. Rutledge and W. I. Denton, both of the research and development laboratories of Socony-Vacuum Oil Co.

"Silicone Polymers—A Brief Survey of Their Preparations, Properties, and Uses" was the title of Mr. Rutledge's talk. He gave a generalized description of the methods of preparation, properties, and applications of the various types of silicone polymers and indicated possible application of some of the properties of silicones to individual problems.

Mr. Denton's address, illustrated with slides, was on the "Relation of Petroleum to the Resin Industry." The development of the present position of the petroleum industry as one of the major suppliers of basic raw materials to the resin industry was outlined by the speaker. Emphasis was placed on processes for the production of basic raw materials rather than on the conversion of the raw materials to finished resins. Mr. Denton outlined some of the newer commercial developments, some developments at the research level, and some new viewpoints on various processes. He pointed out that although the petroleum industry is definitely interested in finished resins, this interest is generally limited to hydrocarbon-type resins.

Hutchison Discusses Silicones

The Eastern New England Section held a dinner-meeting January 15 at the Hotel Puritan, Boston, Mass. The Section's new board of directors, who had been elected by letter ballot, named the following officers for the group: president, Jack Queeny; vice president, George K. McLean; secretary, George E. Pickering; and treasurer, R. White Hubbs. Paul D. Zottu was elected the Section's delegate to the S.P.E. national council, and A. G. Dietz was chosen Section council member. Other members of the board of directors, in addition to the aforementioned, are Frank A. Rideout, E. B. Roberts, and George B. Makepiece.

The meeting featured a talk on "Silicones — Their Interest to the Plastic Industry" by Ira W. Hutchison, of Dow Corning Corp. The talk covered the four types of silicone materials now being produced: (1) compounds and greases; (2) fluids; (3) resins; and (4) elastomers. The most famous member of this first class of silicone materials, and the first to reach commercial importance, is DC 4, a petrolatum-like material which remains practically unchanged over a temperature range from −4° to 400° F. DC 4 is used to protect aircraft ignition systems from humidity and corona discharge and is also valuable for radio and radar parts. DC Antifoam A is another greaselike material which has effective anti-foaming properties in average concentrations as low as 20-400 parts per million. Silicone bearing greases are finding increased application because of their temperature resistance and stability.

Of the second class of silicones, the fluids, the most widely known in the plastics industry are the mold lubricants, according to Mr. Hutchison. Their incompatibility with organic plastics and their ability to withstand high molding temperatures gives better release cleaner molds and improved surface appearance. Both fluids and fluid emulsions are used for these purposes during injection molding and in press polishing of large sheets. DC 7 is another mold lubricant which is particularly suited for lubricating porous-type molds, such as paper, plaster, or wood. Other silicone fluids and oils are used for machine lubrication, hydraulic and damping fluids, and in vacuum diffusion pumps. Sight Savers, silicone treated tissues, have recently been placed on the market for use on lenses and glasses to keep them cleaner and permit easier polishing.

Silicone resins comprise many types. One group, used for heat resistant electrical binders, includes very flexible varnishes used to impregnate glass served magnet wire and to coat glass cloth used in electric motor insulation. Another group is used as vehicles in heat resistant paints. Four such resins are available, two of which polymerize slowly and are quite flexible, while the other two are faster curing, less flexible, and quite hard. By blending these resins a wide range in film hardness and flexibility can be obtained. A unique silicone resin is Pan Glaze, used in the baking industry to replace pan grease and give increased cleanliness and service life.

Elastomers comprise the fourth and last group of silicones, Mr. Hutchison said. At present 12 Silastic stocks are commercially available and comprise two basic forms: pastes and crepes. The pastes are used for coating fabrics, particularly glass cloth, for making laminates, and as caulking or filling compounds. The crepes are used in molding, laminating, and extruding. Physical and electrical properties vary widely, but the Silastics can be used for continuous operation at 300° F. without any deterioration in properties,

and intermittently up to 500° F. With these thermal properties one of the most important uses for Silastic is in heat and moisture resistant gaskets and seals. Extruded Silastic coatings are also especially important for the manufacture of heat resistant lead wires and flexible cables.

Rochester Section Meetings

The Rochester Section, S.P.E., held a meeting on January 20 at Howard Johnson's Restaurant, Rochester, N. Y., with 54 members and guests attending. There was a short business meeting after dinner, at which time the Section's membership drive was considered. At present the Section comprises 47 regular and associate members. Advance programs were discussed by G. Cathcart, program chairman, and were received with approval. Following the business meeting, Theodore G. Clement, styling division, Eastman Kodak Co., spoke on "Principles of Industrial Design as Applied to Plastics." The talk covered the various steps involved in designing a plastic product and was illustrated with color slides.

The Section's previous meeting had been held on December 16 at Bill Rund's Restaurant. Approximately 47 members and guests attended and heard a talk by Robert Dodd, vice president and general manager, industrial resins division, Durez Plastics & Chemical Co., on "Diversified Uses of Phenolic Resins." The lecture was illustrated by many samples showing the various uses of phenolics and was followed by a question and answer period.

The Rochester Section held its regular dinner-meeting February 17 in Lorenzo's Restaurant. Some 37 members and guests heard Hugh Cameron, sales manager of W. T. LaRose & Associates, Inc., speak on "High-Frequency Heating." Mr. Cameron's talk was identical to the one he gave before the February 10 meeting of the New York Section, reported elsewhere in this department. After the talk there was a question and answer period which was followed by the showing of a color-sound motion picture, "The Story of Tenite." A short business session was held at which the membership committee reported that the Section now has 55 members.

The Sections's next meeting will take place March 16, also in Lorenzo's Restaurant. C. Norman Wade, district manager of National Vulcanized Fibre Co., will speak on "Vulcanized Fibre, Its Manufacture and Applications."

Buffalo Section Hears Veverit

Some 33 members and guests of the Buffalo Section attended a dinner-meeting on January 30 at the Hotel Westbrook, Buffalo, N. Y. At the business meeting following the dinner, the Section's new officers were introduced, as follows: president, John E. Miner, Spaulding Fibre Co., Inc., vice president, George J. Goepfert Carborundum Co.; secretary, J. Clarke Cassidy, Jr., Durez Plastics & Chemicals, Inc.; and treasurer, Haiman S. Nathan, Atlas Plastics, Inc. Mr. Miner then presented the committee chairmen for 1948: national director, Earl Russell; professional activities, Elmer Howard; membership, Alex Di Addario; credentials, Mr. Goepfert; finance, Mr. Nathan; program, J. Cox; house, Mr. Nathan; publicity, Mr. Cassidy; historical, Norman Wahl; and educational, S. Pickering. Each chairman introduced his committee and gave a brief summary of activities planned.

Speaker of the evening was James V. Veverit, Buffalo industrial designer, who gave an interesting talk on the functions and aims of industrial designers. With the help of a large number of renderings, mock-ups, and finished products, the speaker explained the sequence followed in designing a product for the market. He stressed the cooperation necessary between the designer's organization and the engineering and sales departments of the client. Following a brief intermission, the Owens-Corning Fiberglas Corp. motion picture, "Watts in Glass," was shown to the audience.

Modern Plastics Competition

For the first time since 1941, *Modern Plastics* will revive the annual plastics competition and this year will hold its seventh *Modern Plastics* Competition. There are 20 competition classifications with an award for each group. Entries are welcome from all concerns and individuals who have had any part in creating or producing a plastic product, component, or new application which has been in production and marketed since August 31, 1945. Entries will be accepted until May 15, and any number of entries may be submitted with no fee or obligation of any kind.

The contest will be judged by six top executives: two from the field of merchandising; two from the field of design; and two industrial users of plastics. Judging will take place on or about June 1, and winners will be announced in the September issue of *Modern Plastics*. Following the competition, traveling exhibits of the prize winning items will tour the United States and other countries. The following are the contest classifications: (1) architecture and building; (2) arts and crafts; (3) business and office equipment; (4) communications; (5) furniture and interior decoration; (6) general hardwares; (7) major household appliances; (8) industrial and machinery; (9) jewelry and novelties; (10) lighting; (11) packaging; (12) signs and displays; (13) photography; (14) radio and musical instruments; (15) scientific; (16) toys and games; (17) transportation; (18) wearing apparel and fashions; (19) miscellaneous; and (20) informative labeling and merchandising. New classifications will be arranged if the number of entries warrant such treatment. Complete details and entry blanks may be obtained from *Modern Plastics*, Department PC, 122 E. 42nd St., New York 17, N. Y.

Discusses Plastic Tile

JOHAN BJORKSTEN, president of Bjorksten Research Laboratories, gave a paper on "Improvement in Surface Characteristics of Plastic Tile" before a meeting of the Plastic Wall Tire Manufacturers Institute in Pittsburgh, Pa., on January 12. Dr. Bjorksten's paper was devoted to an explanation of the Logoquant treatment for reducing the electrostatic charge and improving the resistance to chemicals and marring of polystyrene plastics. An explanation of this treatment was given on page 90 of the October, 1947, issue of India RUBBER WORLD.

New Geon Resins

THREE new members of the Geon 200 series resins have recently been made available by B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, O. The 200 series, made up of modified polymers of vinyl chloride, has included Geon Resins 202 and 203. Now Geon Resins 204 and 205 are in commercial production, and Geon Resin 200 X 14 is available in experimental quantities. These new materials offer increased thermo-plasticity and lowering of softening point, together with greater solubility. These properties make them valuable as "tailored" molding resins, and their good solubility makes them highly useful in the solution coating field.

Table 1 shows the solubility of the Geon 200 series resins in methyl ethyl ketone. The "% Solubility" was considered to be the maximum amount of resin dissolved to give a viscosity of approximately 500 centipoises. The data presented were obtained by dissolving the resin in methyl ethyl ketone at the temperatures shown, agitating the solution for 24 hours at the same temperature, and then aging the solution for seven days at room temperature. Viscosity measurements were then taken at the indicated temperatures. It will be seen that a total solids content as high as 35% may be obtained with Geon 200 X 14.

Typical physical properties of the Geon 200 series resins are shown in Table 2, which shows that the new resins are more thermoplastic and process at much lower temperatures than Geon Resins 202 and 203. As a result, the new resins can be processed and molded into rigid articles with little or no plasticizer. Improved thermoplasticity more than compensates for the lower heat stability of the new materials since high processing temperatures are not necessary.

Geon 205 has been designed as a rigid molding material requiring no plasticizer and is particularly well adapted for use in the molding of phonograph records, having low noise level, high fidelity in reproduction, outstanding wearability, and high resistance to breakage. Other applications include the molding of rigid sheeting for use in playing cards and advertising novelties, and the manufacture of battery separators, industrial lacings, rigid piping, and heat-sealable name tapes.

TABLE 1

Dissolved at °C.	7-Day Viscosity Taken at °C.	% Solubility Geon 202	Geon 203	Geon 204	Geon 205	Geon 200 x 14
30	30	7.5	....	15	17.5	30
70	30	10	....	20	20	35
50	50	10	12.5	17.5	20	32.5
70	70	10	17.5	20	22.5	35

TABLE 2

	Geon 202	Geon 203	Geon 204	Geon 205	Geon 200 x 14
Specific viscosity*	0.40	0.36	0.30	0.27	0.18
Specific gravity	1.41	1.42	1.44	1.46	1.54
Optimum milling temperature, °F.	240	240	240	210	170
Heat stability (rated numerically, no. 1 best)	1	1	2	3	3
Tensile strength, p.s.i.	†	†	6875	5885	4410
Mean modulus of elasticity, x10⁵ per sq. in. (under flexural strength)	†	†	3.92	4.17	3.70

(*Footnotes for Table 2*)
* Taken at 20° C. for 0.4% solution in nitrobenzene.
† Not usually used in an unplasticized form.

Scientific and Technical Activities

Division of Rubber Chemistry, A. C. S., to Meet in Chicago

THE Division of Rubber Chemistry of the American Chemical Society's meeting program and abstracts of papers to be presented at the technical sessions in Chicago, Ill., April 21, 22, and 23, at the Hotel Sherman, have been tentatively established and are given below. It is unlikely that there will be any major changes in either the program or the abstracts of the papers, but minor points in connection with one or two of the papers had not been entirely cleared up at the time this issue went to press.

Details regarding the banquet of the Division and the general cocktail party to precede it, and the luncheon of the Division's new 25-year club, were given on page 630 of our February issue. The committee of suppliers in charge of the cocktail party, under the chairmanship of C. M. Baldwin, United Carbon Co., consists of W. N. Crumpler, C. K. Williams Co.; S. A. Davis, C. P. Hall Co. of Ill.; J. P. Sheridan, New Jersey Zinc Sales Co.,; W. O. Hamister, Naugatuck Chemical Division, United States Rubber Co.; and J. A. Myers, United Carbon. R. C. Dale, Inland Rubber Corp., is chairman of local committee on arrangements for the Chicago meeting, and H. A. Winkelmann, Dryden Rubber Division, Sheller Mfg. Corp., is chairman of the 25-year club committee.

The morning of April 21 has been set aside for registration. The technical sessions will begin at 2:00 p.m. on that day, with Chairman Harry F. Outcault, of St. Joseph Lead Co., presiding and making the introductory remarks. The technical sessions will continue, starting at 9:00 a.m. and 2:00 p.m. on April 22. The business meeting will be held at 10:55 a.m., April 22. The final technical session will take place the morning of April 23, starting at 9:00 a.m.

Abstracts of the papers follow.

WEDNESDAY AFTERNOON—APRIL 21

Solvent Polymerization of Isoprene and Styrene-Isoprene with Tert.-Alkyl Peroxides. Tert.-butyl hydroperoxide and several of its derivatives have been studied as catalysts for the preparation of low molecular-weight polyisoprene and styrene-isoprene copolymer. The polymerizations were carried out at 80 to 130° C. in pressure reactors for periods of 20-96 hours, and the products were tested for yield and intrinsic viscosity.

Solvent polymerizations of isoprene gave 70-95% yields of polyisoprene which had intrinsic viscosities ranging from 0.15 to 0.65, depending on conditions. The clear, nearly colorless polymers dissolved readily in aromatic and chlorinated solvents to give extremely stable solutions. The usual effects of monomer concentration, temperature, nature of solvent, etc. on the polymerization were found. Tert.-butyl peresters and di-tert.-butyl peroxide tended to form gels much more readily than tert.-butyl hydroperoxide, even though the latter shows stronger peroxidic properties.

The styrene-isoprene copolymer study was limited to the high styrene ratios which yielded resinous products. By polymerizing a 2:1 ratio of styrene-isoprene in naphtha with tert.-butyl hydroperoxide, a clear colorless resin with an approximate molecular weight of 2,500 was prepared in 95-98% yields in 20 hours. The molecular size and melting point of the resin can be changed at will over a rather large range by choice of solvent, temperature of polymerization, nature of peroxide, and isoprene-styrene ratio. The effect of the various factors was similar to that observed with isoprene alone.

A few polymerizations with benzoyl peroxide indicated that it did not give results comparable to the tert.-butyl peroxides in the above systems. Lloyd H. Perry, Union Bay State Chemical Co., Cambridge, Mass.[1]

The Effect of Low Polymerization Temperatures on Some Properties of GR-S Vulcanizates. The effect of polymerization temperatures below 30° C. on the physical properties of the vulcanizates of GR-S type of polymers has been studied for several years. Some years ago it was found that polymerization temperatures down to 10° C. would give a copolymer with better processing and at the same time produce vulcanizates that have better stress-strain properties and more resistance to flex crack growth, tear, and abrasion than with the 50° C. standard GR-S. The early formulae resulted in extremely long reaction times; so temperatures were not carried below 10° C., but definite trends in physical properties with polymerization temperature were found. More recently, faster formulae have been developed, and polymerizations have been conducted at sub-freezing temperatures in the presence of an anti-freeze in nearly normal reaction times. Polymerizations have been carried out in pilot-plant reactors after preliminary runs in bottles, and several polymers have now reached the production stage.

A readily processible butadiene-styrene copolymer prepared at 5° C. gave a vulcanizate that had 29% better unaged tensile, 18% better aged tensile, 53% better hot tensile, and 450% better flex life than a corresponding GR-S-10 stock. L. H. Howland, W. E. Messer, V. C. Nekutin, and V. S. Chambers, U. S. Rubber, Naugatuck, Conn.

Polymerization of Various Monomers in the Buna S-3 System. A butadiene styrene polymer produced in the Buna S-3 system with materials available in this country is a very stiff polymer which could be heat softened to any desired plasticity. The most distinctive differences between the Buna S-3 polymerization system and GR-S were the use of an alkyl-naphthalene sulfonate emulsifier, limited modification with Dixie (diisopropyl xanthogen disulfide) and the recovery of the polymer at lower conversion. A tread wear about 50% better than GR-S gives has been obtained with a polymer prepared in the S-3 system.

In view of these interesting results the Buna S-3 polymerization system was applied to the preparation of polybutadiene, polyisoprene and copolymers of these monomers with styrene, monochlorostyrene, and dichlorostyrene. The resultant polymers were, in most cases, found to be superior in their cut growth resistance to similar polymers prepared in the GR-S recipe. The monomers maintained the same relative rates of polymerization although polymerization was somewhat slower in the Buna S-3 than in the GR-S recipe. R. H. Poirer, D. N. Marquardt, and L. B. Wakefield, Firestone Tire & Rubber Co., Akron, O.

Preparation and Properties of Cyclorubber. A brief historical development of thermoplastic rubber isomers and their properties are presented. Several methods of preparation are mentioned. Preparation and properties of a typical commercial cyclorubber, Marbon-B, are given, together with its application in the field of moisture-proof coatings, as a hot melt component, and in lacquers, paints, electrical insulation printing inks, and adhesives. A. H. Krause, H. Scott, and A. G. Susie, Marbon Corp., Gary, Ind.

Alkyl Phenols as Non-Discoloring Antioxidants for Synthetic Rubber. Synthetic elastomers manufactured by copolymerzing butadiene with other monomers such as styrene or acrylonitrile frequently contain 1-2% of a stabilizing agent such as phenyl-*beta*-naphthylamine, an antioxidant which tends to discolor and render the synthetic rubber dark in color. In a search for suitably effective non-discoloring antioxidants, alkyl phenols were examined as antioxidants for copolymers of butadiene with acrylonitrile and with styrene (GR-S).

The study revealed that alkyl phenols impart protection to polymers and vulcanizates without discoloration. The degree of protection varied widely, depending on the number, structure, and location of substituent alkyl groups.

In butadiene-acrylonitrile copolymers the alkyl phenols ranged in effectiveness from materials, such as *p-tert*-alkylphenols, which gave only a fair degree of protection against aging, up to certain 2,4,6-trialkylphenols which imparted outstanding age resistance. Exemplary of the latter materials are 2,4-dimethyl-6-isobornylphenol, 2,6-di-*tert*-butyl-4-methylphenol, and 2,6-di-*tert*-octyl-4-methylphenol. In general the 2,4-dialkylphenols and 2,4,6-trialkylphenols which contained methyl as the *para* substituent were superior to similar or isomeric alkyl phenols which contained larger *para* substituents or *meta* substituents.

In GR-S the same 2,4,6-trialkylphenols were effective non-discoloring antioxidants. Differences in antioxidant activity however, were not so great in GR-S as in the N-type polymers, particularly in white stock vulcanizates where the variations in the ordinary aging tests were rather small. Differences in order of activity were noted between antioxidants in GR-S polymer and vulcanizates. In GR-S the non-discoloring antioxidant effectiveness was substantiated by natural weathering and by oxygen absorption measurements. Leland J. Kitchen, Harry E. Albert, and George E. P. Smith, Jr., Firestone.

The Vulcanization of Neoprene with Antimony Trisulfide. A new method of

[1] Work done at Newport Research Laboratory by special arrangement with Newport Industries, Inc., Pensacola, Fla.

vulcanizing neoprene to obtain compounds having high resilience, low heat build-up, and low set is discussed. The stress-strain relation of the vulcanizate differs from that of a conventional neoprene compound since the modulus at low elongation is less in relation to that at high elongations than is normally obtained. The hardness is lower than would be expected for a stock having as low a set and as high a resilience. These effects are accomplished with little increase in scorching tendency by the use of small amounts (0.125 to 0.50-part on 100 parts of neoprene) of antimony trisulfide. All of the various polymorphous forms of the sulfide are equally effective. The antimony sulfide is effective both in the presence and the absence of the normally used oxides of zinc and magnesium. Data presented compare the new compounds with conventional neoprene stocks and those accelerated with Permalux (di-ortho-tolylguanidine salt of dicatechol borate). Maynard F. Torrence, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Effect of Light on Neoprene. I. Discoloration of GR-M Vulcanizates by Direct Sunlight. Vulcanized white GR-M stocks discolor differently in direct sunlight than in an accelerated light aging unit. It is, therefore, impossible to predict the discoloring effects of direct sunlight by means of standard accelerated light aging tests.

The initial effect of outdoor exposure to direct sunlight on white GR-M stocks is a bleaching that takes place in the first few hours of exposure. This is followed by a yellowing that reaches its maximum in one week to two weeks. On continued exposure up to six months the yellow color diminishes, owing to a further bleaching which tends to make the sample gray.

In accelerated light aging tests the discoloration proceeds continuously from white to yellow and finally to a dark brown. No appreciable bleaching is observed. The rate of discoloration is rapid, and exposures of eight hours may give more discoloration than that produced in six months under outdoor conditions.

The effect of such variables as the curing time, nature and amount of white pigment, and the presence of selected antioxidants on the discoloration during natural and accelerated light aging is shown. P. A. Sanders, du Pont.

THURSDAY MORNING—APRIL 22

Rubber Reinforcing Properties of High Abrasion Furnace Black. Highly reinforcing furnace blacks became available in commercial quantities during 1947. The properties of a high abrasion furnace black, when compounded in rubber, are presented in this paper and are compared to the properties of representative blacks of the SRF, HMF, and EPC types. Detailed rubber data including stress-strain characteristics, heat build-up, resilience, flex life, compression set, abrasion resistance, and milling and extrusion characteristics are presented at variable black loadings in both natural and GR-S rubber for the four different types of blacks.

Numerous road tests on Phillips Petroleum Co. test vehicles have shown that this high abrasion furnace black is from 10 to 20% superior to EPC black in abrasion resistance as well as being markedly superior in its resistance to chipping and cracking.

The superior reinforcing properties of HAF black are illustrated in "bound" rubber figures which show that it not only attracts more rubber to its surface, but holds it more tightly than EPC black. L. R. Sperberg, J. F. Svetlik, and L. A. Bliss, Phillips Petroleum Co., Bartlesville, Okla.

Processing Characteristics of Reinforcing Furnace Blacks. Reinforcing grades of carbon black made by the furnace process are now commercially available in abundant supply. This situation is in sharp contrast to the existing shortages of channel-type blacks. The substitution of these furnace blacks for channel blacks in recipes originally designed for channel blacks has resulted in the furnace blacks being characterized as promoting fast curing and scorching, particularly when used in natural rubber tread recipes. It has also been observed that a number of the furnace blacks are superior to the channel-type blacks in their effect on processing. This paper discusses the curing and scorching properties of furnace blacks and describes an extrusion shrinkage test which has proved useful for judging processing properties.

The compounding procedures which result in a change in curing rates are the following; sulfur-accelerator loading variations; incorporation of acidic retarders; and the use of accelerators other than MBT or MBTS. Although only relatively small effects on scorching can be attained when low sulfur and low accelerator (MBTS) loadings are used, the use of other accelerators and retarders can be very pronounced.

An inherently slow-curing furnace black can also be made, and data presented show that the direct substitution of this type of black for channel black in a natural rubber-MBT accelerated tread recipe is not accompanied by fast curing and scorching. The production of this reinforcing furnace black possessing the curing properties of a channel black involves a modification of the furnace process, adding to the cost of the product. In general all these procedures do not have any deteriorating effect on the physical properties of the final rubber compositions. E. M. Dannenberg and C. A. Stokes, Godfrey L. Cabot, Inc., Boston.

Acceleration by Fine Furnace Black Compounds. Fine furnace black, a recent development in carbon black technology, presents definite scorch problems, especially when used as a replacement for channel black in tire tread stocks. The degree of scorching can be reduced by: (1) use of chemical retarders; (2) reduction in accelerator concentration; (3) reduction in sulfur concentration. Chemical retarders alone are insufficient and must be augmented by a decrease in accelerator and (or) sulfur. Reducing the accelerator sacrifices modulus, resilience, and, most important of all, age resistance for the benefit of processability. Reducing sulfur improves aging and scorch resistance, and through proper acceleration the effects on other physical properties, i.e., modulus, hardness, and resilience, can be minimized. A high-modulus, age-resistant accelerator permits lower sulfur concentrations, resulting in further improvement in scorch resistance and relatively normal hardness and resilience on aging. In a fine furnace black tread, accelerator and sulfur contents are varied, showing the effect on modulus, resilience, and scorch. A standard channel black tread is used as a control. O. H. McCollum, du Pont.

Carbon pH and Structure in Rubber Compounding. The new furnace carbons available to the rubber compounder today have, in effect, added two new ingredients for his recipes: namely, high pH and carbon structure. Besides selecting a carbon black on the basis of its fineness of specific surface, the effects of structure and pH on processing, curing, and physical properties must be carefully weighed by the compounder. Alternative methods of obtaining good processing in GR-S are discussed. The consequences of high pH in both GR-S and *Hevea* are reviewed, and suggestions for capitalizing on this property are made. H. A. Braendle, H. C. Steffen, and J. R. Sheppard, Columbian Carbon Co., Brooklyn, N. Y.

Safe Acceleration for Use with Fine Particle Size, Reinforcing Furnace Blacks (2,4 Dinitrophenylbenzothiazyl Sulfide). The newer fine furnace carbons are of increasing interest because of their excellent reinforcing properties in rubber and because of the potential economy of their production as compared to channel blacks. These blacks, variously referred to as reinforcing furnace (RF) or very fine furnace (VFF) blacks, are characterized by their lower acceleration requirement and by a pronounced tendency to scorch at normal processing temperatures. The scorchiness problem is particularly critical in natural rubber stocks, and a need is indicated of much safer accelerators than are now offered to the rubber compounder. Attempts to meet the scorching difficulty by decreasing the amount of conventional accelerator have not been entirely effective, not only because scorchiness is not adequately lessened thereby, but also because stocks cured with a deficiency of accelerator show definite symptoms of "accelerator starvation" or are evidenced by low tensiles, lack of rebound, lethargy in modulus development, and poor heat-aging characteristics.

2,4-Dinitrophenylbenzothiazyl sulfide has been found a very effective and unusually safe accelerator for natural rubber stocks reinforced with the new furnace blacks. Data are presented comparing the cure, scorchiness, and aging properties of 2,4-dinitrophenylbenzothiazyl sulfide with bis-(benzothiazyl) disulfide and N-cyclohexylbenzothiazole sulfenamide in a fine furnace black-natural rubber tread stock. The excellent aging properties of 2,4-dinitrophenylbenzothiazyl sulfide is thought to be associated with the fact that a comparatively large proportion of thiazole can be incorporated in this form without danger of scorch. F. L. Holbrook and B. A. Hunter, Naugatuck Chemical, Naugatuck.

The Tackiness of Butyl and Natural Rubber. A comparative study of the tackiness of Butyl and natural rubber was made using a tackmeter similar to that described by W. F. Busse, *et al.*[2] Since the primary objective was to obtain some basic information on the factors involved in butt-splicing inner tubes, the tackiness measurements were made on freshly cut surfaces of cylindrical samples contacted under various time-temperature-pressure conditions. The reproducibility of the test was surprisingly good, with the average deviation less than 10%.

The temperature of the knife used to cut the samples was found to be of primary importance. The tackiness of Butyl compounded with 50 parts of SRF black (no curatives) decreased regularly with increasing knife temperature over the range 80 to 500° F.; whereas natural rubber showed an increase in tackiness with increasing temperature. At about 500° F. the knife temperature presently employed in butt-splicing machines, Butyl showed tack values of about 30 p.s.i., compared to above 60 p.s.i. for natural rubber. On the other hand, the tackiness of Butyl was about 50 p.s.i., compared to 35 p.s.i. for natural rubber when the samples were cut at 80° F. knife temperature.

Increased time and increased pressure of contact favor better splicing of Butyl and natural rubber, as would be expected.

[2] *J. Applied Phys.*, **17**, 376 (1946).

Butyl samples cut with a cold knife were effectively spliced by contacting for six seconds at 50 p.s.i.; increasing the pressure of time above this figure had very little effect on Butyl owing to its limiting stock strength (about 55 p.s.i.). The measured tackiness of natural rubber continued with increasing pressure and/or time up to 65 or 70 p.s.i. pull, at which value the samples would tear from the clamps. The ultimate stock strength of natural rubber at room temperature is therefore much higher than that of Butyl.

The stock strength and also measured tackiness of Butyl were influenced by the type of black, with values ranging from 56.6 p.s.i. for EPC (Wyex) to 38.1 for MT (Thermax). Paraffin wax and stearic acid, when present to the extent of three parts per 100 parts of polymer, decreased the tack of Butyl about 40 to 50%. Sulfur and accelerators had very little influence on tack even when the stock was precured slightly or scorched. R. K. Beckwith, L. M. Welch, and J. F. Nelson, Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J., and A. L. Chaney and E. A. McCracken, Esso Laboratories, Baton Rouge, La.

Basic Reactions during Reclaiming. II. The Effect of Aging of the Scrap, Storage of the Reclaim, and the Effect of Solvent Naphtha on Reclaiming of Natural Rubber. The effect of aging of the scrap prior to reclaiming is reflected in a greater tendency toward molecular breakdown during reclaiming, particularly during short reclaiming intervals or in the presence of alkali. Longer reclaiming intervals again cause a recombination of the chain fragments originally formed. The characteristic grouping of the data and curves previously obtained for pot heater and digester alkali as well as digester water and metallic chloride reclaims is not disturbed by the aging of the scrap. This characteristic again indicates the importance of the surrounding medium during the reclaiming process.

Storage of reclaims over a period of months is discussed. Alkali reclaims were found to be least stable, but regardless of the reclaiming treatment (pot heater or digester) the least stable reclaims were those subjected to short reclaiming periods.

The addition of increasing amounts of solvent naphtha is not reflected in the acetone extract of the reclaim; however, molecular breakdown is considerably increased by it even though the latter is again dominated by the surrounding reclaiming medium. Smaller amounts of solvent naphtha decrease the unsaturation of the reclaims to a sizable degree; whereas larger amounts show this effect to a lesser degree. Reclaims prepared with solvent naphtha, however, show at all times a smaller unsaturation than those where solvent naphtha had not been added. Possible causes of these effects are discussed.

Reclaims prepared with solvent naphtha showed greater storage stability than those reclaimed in the absence of solvent naphtha.

Infrared analysis of pot heater and digester reclaims did not indicate the formation of oxygen bonds during the reclaiming process.

Throughout the investigation the predominance of the influence of the surrounding reclaiming atmosphere was again recognizable. These findings, as well as the high rate of molecular breakdown during the initial reclaiming periods and the instability of such reclaims, again point toward the occurrence of hydroperoxidic chain reactions. D. S. le Beau, Midwest Rubber Reclaiming Co., East St. Louis, Ill.

A Strain Test for Evaluation of Rubber Compounds. Measurements of elongation of rubber vulcanizates at a fixed stress have been made with a precision much greater than can be obtained in the usual measurements of stress at a specified elongation. Such measurements form the basis of a strain test developed to characterize rubber vulcanizates in control and research testing. Statistical analyses show that the errors introduced in the actual strain measurements are negligible compared to those introduced by variations during compounding and curing; whereas the errors introduced by the usual measurements of stress at a specified elongation are of the same order of magnitude. The high precision of strain testing has been used to detect variations within a single sheet of vulcanized rubber and variations among sheets cured from the same compounded batch. It has also been possible to determine with a single sheet its change in stiffness or modulus with age. The uniform treatment of specimens in the strain test makes them particularly useful for precise measurements of set. Besides the high precision of the strain test, the decrease in elongation with time of cure apparently follows the laws of a second-order reaction which makes it possible to calculate three vulcanization parameters. F. L. Roth and R. D. Stiehler, National Bureau of Standards, Washington 25, D. C.

A Visco-Elastic Study of Modulus. Modulus of rubber vulcanizates has been separated into elastic and viscous components for a study of the effects of compounding and vulcanization variables. A simplified view of the factors contributing to modulus has been taken which is both practical and a good approximation of theoretical concepts. Modulus, determined in the usual manner, represents the sum of the force required to overcome the viscosity present only in a non-equilibrated system and the elastic force which is not dissipated with time. Total modulus and elastic modulus are determined experimentally, while viscous modulus is the difference between these values. The magnitude and ratio of elastic and viscous modulus are the determining factors in certain physical properties of a vulcanizate, among these are resilience and retraction rate.

The elastic modulus was found to be directly proportional to temperature as predicted and illustrated by previous workers. The reinforcement obtained by cross-links and the more permanent absorptive effects are measured by the elastic modulus exclusive of stiffening effects due to frictional considerations. The viscous modulus does not vary linearly with temperature, but changes in a fashion similar to viscosity effects in oils, i.e., much greater increase at lower temperatures. The viscous modulus is nearly constant for a particular compound regardless of the state of vulcanization, although there is a slight increase with increased vulcanization.

The effect of various ingredients on true reinforcement can be separated from the effects they have on softening or stiffening.

The change in physical properties of a vulcanizate with temperature can be predicted from elastic and viscous moduli changes. L. T. Eby and D. J. Buckley, Standard Oil Development, Elizabeth.

The Thermal Conductivity of Rubber Compounds. The thermal conductivity of rubber-like materials is discussed from a general point of view. The authors conclude that it is impractical to increase the thermal conductivity of the polymers themselves. However the thermal conductivity of rubber compounds may be increased considerably by the use of various fillers. It is found that for compounds containing fillers:

1. The effective thermal conductivity of rubber compounds is independent of the size of the filler particles.
2. The shape of the filler particles plays an important part.
3. Formulae are presented which enable one to estimate the effective thermal conductivity of a filler in rubber from the shape and thermal conductivity of the particle.
4. Oriented fillers are several times more effective in increasing the thermal conductivity of compounds than are channel blacks.
5. A filler poor in electrical conductivity may have a relatively high effective thermal conductivity in rubber.
6. Fully to evaluate the effective thermal conductivity of an oriented filler one must, in general, measure the thermal conductivity in three mutually perpendicular directions.
7. The increase in the thermal conductivity resulting from the use of mixtures of different fillers in rubber compounds under suitable conditions is considerably greater than the total increase in the thermal conductivity for the fillers used separately.

The experimental apparatus and methods are described. D. R. Elliott, J. W. Marshall, and A. W. Bull, U. S. Rubber, New York, N. Y.

The Effect of Specimen Size on the Tensile Strength of Natural Rubber and GR-S.[3] Peirce's equation, which relates served tensile strengths of textile fibers to their lengths, was found to be applicable to rubber-like materials if specimen volume is used in place of specimen length. Experiments in which the tensile strengths of GR-S and natural rubber compositions were determined for a range of specimen sizes yielded results in close accord with theory. A ten-fold increase in the volume of the material resulted in a decrease of 308-349 and of 167 pounds per square inch in the observed tensile strength of GR-S and comparable natural rubber stocks, respectively. The numerical magnitudes of the slopes of the straight lines obtained, when tensile strengths were plotted against the logarithms of the relative specimen volumes, are shown to bear a direct relation to the homogeneity of the stock under test.

The use of a special type of dumbbell sample with a constricted center obviates failure at the shoulders and elsewhere, attributable to heterogeneity, and has made possible the practical application of the method. T. Higuchi,[4] H. M. Leeper,[5] and D. S. Davis, Government Laboratories, University of Akron, Agent for ORR, Akron.

Cellular Ebonites from Nitrile-Type Synthetic Rubbers. This paper is a description of some compounding studies directed toward improving the compression properties of cellular ebonites derived from nitrile-type synthetic rubbers. Most of the study was confined to the commercial rubbers known as Chemigum-N3 and Chemigum-N3NS, since this type of rubber was found to give a more complete blow and lower mold shrinkage than other types tested.

Variation of sulfur content in these cellular ebonites produces some variation in compression properties, but not nearly to the extent reported for non-cellular ebonites of this general type. Increase in

[3] This investigation was conducted under the sponsorship of the Reconstruction Finance Corp., Office of Rubber Reserve, in connection with the Synthetic Rubber Program of the United States Government.

[4] Present address, University of Wisconsin, Madison, Wis.

[5] Present address, William Wrigley, Jr., Co., Chicago.

amount of blowing agent beyond that required to produce the desired blow tended to impair the compression properties of the product. Increase in time of mill breakdown tended to improve the compression properties, but a similar effect was obtained by employing selected plasticizers which shorten the breakdown time.

Reinforcing agents such as carbon black and iron oxide were found to have a limited influence on compression properties; hard rubber dust was similar in its effect. The vulcanization reaction is quite exothermic, and the improvement in properties imported by certain pigments is believed to be a result of lowering the exothermic heat of vulcanization.

It is possible to shorten the time of cure by using selected accelerators, but the highly exothermic reaction produces vulcanizates of inferior quality if the vulcanization is carried out too rapidly. In some fast-curing systems it was found desirable to employ a retarder to delay the cure until complete blowing had taken place. Richard A. Clark and LaVerne E. Cheyney, Battelle Memorial Institute, Columbus, O.

The Effect of Pigments on the Hardness of Natural and Synthetic Rubbers. This paper deals with the possibility of calculating the Shore A hardness of a rubber stock over a loading range from a test at a single loading.

If a loaded elastomer is considered as a uniform elastic matrix containing inelastic particles, its modulus may be calculated from the Guth and Gold equation (1) when the pigment filler has symmetrical particles, and from the Guth equation (2), when the particles are asymmetrical (rod-shaped).

(1) $M = M_0 (1 + 2.5V + 14.1V^2)$

(2) $M = M_0 (1 + 0.67fV + 1.62f^2V^2)$

M = modulus of loaded stock.

M_0 = modulus of unloaded matrix.

V = ratio of volume of filler to total volume.

f = shape factor = ratio of the length to diameter of the particle.

Since hardness is a compression modulus at a variable indentation, equations (1) and (2) may be applied to Shore hardness provided it is assumed that the force required to cause a given indentation is proportional to the amount of indentation (amount of compression). On the basis of this assumption, equation (3) relating compression modulus (M) with Shore A hardness (S) was derived:

(3) $\log M = 0.02S - 1$

Combining equations (3) with equations (1) and (2) respectively:

(4) $$S = S_0 + \frac{\log (1 + 2.5V + 14.1V^2)}{0.02}$$

and

(5) $$S = S_0 + \frac{\log (1 + 0.67fV + 1.62f^2V^2)}{0.02}$$

Hardness values for calcium carbonate and carbon black pigments of widely differing particle size were obtained over a considerable loading range for each pigment. These values agreed surprisingly well with those calculated from the appropriate equation (4) or (5). Hardness at equivalent state of cure thus appears to depend primarily on the volume loading and particle shape of the pigment filler and to be unaffected by particle size, crystalline structure, chemical nature of the particle surface, or chemical composition of the pigment. L. H. Cohan and R. E. Smith, Witco Chemical Co., New York.

Vulcanization at High Pressures. A technique was developed for vulcanizing cylinders of rubber ½-inch in diameter up to one inch high at pressures up to 100,000 pounds per square inch, using a small laboratory press (eight-inch platens). The specially designed mold was made of alloy steel according to general principles from the high pressure work of Bridgeman. It was prestressed at 200,000 p.s.i.

The temperature in the mold cavity was carefully calibrated with thermocouples to determine the equivalent length of cure of the test specimens. Cylinders of GR-S tread stock were vulcanized for a range of cures at 1,000, 20,000, 50,000, and 100,000 p.s.i. and also in a regular type of mold for which the pressure was not determined.

Although the volume compression at 100,000 p.s.i. is about 20% all of this is recovered when the pressure is released. This fact was ascertained by precise density measurements of the test specimens.

The electrical resistivity of the test pieces increased with higher vulcanizing pressures, from 5×10^{13} ohm-cm. for samples vulcanized at 1,000 p.s.i. to 1099×10^{13} ohm-cm. for those vulcanized at 100,000 p.s.i. This point is taken to indicate the existence of a better carbon black dispersion in the samples vulcanized at high pressures. The explanation for this statement may be the reduction of carbon black flocculation during the cure by the high viscosity of the rubber induced by high pressure. This effect of pressure on viscosity is well known for organic liquids and is large.

The dynamic modulus, internal friction, and resilience of the test specimens were determined with the Goodyear Vibrotester. The effects of high vulcanizing pressures on these properties is pronounced. It consists apparently in an increased rate of cure upon which is superimposed effects due to the variation in the type of carbon black dispersion. The result is, in general, the attainment of a more resilient GR-S tread stock at a reduced vulcanization time. C. S. Wilkinson, Jr., and S. D. Gehman, Goodyear Tire & Rubber Co., Akron.

FRIDAY MORNING—APRIL 23

Coagulant Deposition of Latices. I. Many products such as balloons, dolls, gloves, automotive parts, coated trays, baskets, and wire are dipped from latex. Several patents describe the basic procedures employed. Most processes rely upon the coagulation of latex as brought about by the action of destabilizing chemicals in solvent media.

This work was undertaken to determine the effects of operating variables in this type of manufacture. The results are reported to stimulate interest and further work in this field. It was considered best to divide the work and report into at least two parts; the first deals only with deposition from natural latex as affected by: (a) time of immersion or "dwell"; (b) coagulant concentration; (c) latex pH; (d) latex solids; (e) latex viscosity. The second and later parts will include neoprene latex and other coagulating agents.

Experimental procedure is described in detail, and data obtained are interpreted graphically. A bibliography of pertinent literature and patents is included. H. B. Morris, and R. F. Hindever, Eagle Rubber Co., Ashland, O.

High-Styrene Resins in Rubber Compounding. The use of high-styrene resins in the field of rubber compounding, particularly with synthetic rubber has been of recent origin. The high-styrene copolymer resins, Marbon S and Marbon S-I, were the first commercial products of this class manufactured in this country. Data are given on the properties of these resins and their uses in reinforcing the following elastomers: GR-S, nitrile rubbers (GR-A), polychloroprene (GR-M), and natural rubber, particularly in non-black stocks. A. G. Susie and W. J. Wald, Marbon Corp.

Stability of Accelerators as Affected by High Processing Temperatures. Reports from the rubber industry indicate an increasing trend toward high-speed Banbury mixing during which temperatures are generated in the range of 300° F. In view of the widespread practice of adding accelerators during the latter part of the Banbury mix, a study has been made to determine the effect of such high processing temperatures on the activity of a representative group of rubber accelerators.

These general conclusions are indicated by results from duplicate batches containing each acceleration. The batches were identical, and both mixed in a laboratory 1 B Banbury operating at 350° F., but to one batch of each pair the accelerator was introduced in the Banbury two minutes before the end of the mix, and to the other the accelerator was added on a relatively cool sheeting mill.

(1) All accelerators tested show some impairment in strength due to the high processing temperature.

(2) Thiazoles, thiazole derivatives, and activated thiazoles show but slight impairment and in general are considered satisfactory for high-speed Banbury mixing.

(3) Thiurams and dithiocarbamates lose greatly in accelerating value, and their use should be confined to relatively low-temperature processing.

(4) Aldehyde amines show widely varying degrees of impairment and thus cannot well be classified as a group with respect to suitability for high temperature processing. F. L. Holbrook and T. H. Fitzgerald, Naugatuck Chemical.

A Contribution to the Knowledge of Compounding Rubber with Petroleum Products. I. Correlation of Chemical Characteristics of Higher Boiling Fractions of Petroleum with Their Compounding Properties. Present practice in evaluating rubber compounding ingredients which are petroleum fractions is to measure and compare physical properties of rubber compounds containing them. This paper presents a more direct method of evaluation by chemical analysis of the materials themselves.

It has been found that all petroleum products which originate from higher boiling fractions of crude oil can be defined as consisting of five basic groups of components that can be identified and quantitatively determined by chemical methods of analysis. These five groups of components have been isolated and tested in test compounds of GR-S and natural rubber. Each of these groups of components shows typical behavior in the test compounds, affecting differently both the curing characteristics and the physical properties of a rubber compound. These tests, as well as tests on a number of petroleum products containing these basic groups of components in various proportions, have revealed the possibility of predicting the performance of the petroleum products without resorting to the present practice of mixing and testing a rubber compound. The test results, presented in tables and graphs, show that the performance of a petroleum product in rubber depends on the type and proportion of the basic components in the compounding ingredient.

The characterization of petroleum products reported in this paper should prove especially useful for identification of rubber compounding ingredients of the groups known as plasticizers, extenders, and process oils, which are offered on the market

under a multitude of trade names. Fritz S. Rostler.

II. A Method of Quantitative Analysis for Classification and Identification of Petroleum Products Used as Compounding Ingredients in Rubber. A quantitative method of analysis has been developed which defines high boiling fractions of petroleum as consisting of five groups of components of characteristic reactivity. The preceding paper showed the correlation of the analytical data obtained with the behavior of the petroleum products in rubber compounds. This paper details the analytical methods employed to determine and identify the characteristic components.

The method of analysis is gravimetric and consists in principle of step-wise precipitation with sulfuric acid. Techniques, apparatus, and chemicals used in the analysis are described. Investigations which led to adoption of the test conditions are reported. Examples of analyses are given, as are analytical data collected on a great number of samples of typical compounding ingredients originating from petroleum. Compositions of petroleum products on the market are shown in tabular form. The variation in compositions is considerable even for products sold under the same label.

The method is simple and can easily be handled by laboratory technicians. It lends itself to routine analysis for raw material control. Although originally developed for testing petroleum products for rubber, the method is generally applicable to all petroleum products and bitumens of high boiling range.

The paper suggests a means to identify and describe petroleum products and other bitumens by chemical characteristics rather than by trade names and functional terms. Fritz S. Rostler, Golden Bear Oil Co., Oildale, Calif., and Heinz W. Sternberg,[6] Wilmington Chemical Corp., Wilmington, Del.

A Study of the Effects of a Petroleum Type of Plasticizer on Various Furnace Blacks in Natural Rubber. The scarcity of natural gas and the low yields of the channel black process have resulted in intensive developments on furnace-type blacks. This work has resulted in the reinforcing types (RF) of furnace blacks, now offered as replacements for channel black. The higher pH of the furnace blacks has resulted in faster cures and greater scorching tendency in both GR-S and natural rubber. This study has been undertaken to determine the effectiveness of a petroleum-type plasticizer with normal and high black loadings as a processing aid in furnace black-natural rubber compounds. Data presented bring out the value of such a softener in controlling sulfur bloom in the uncured compounds as well as compounds on the undercured side. Increased amounts of softener have the usual effect on the original physical properties, such as reduction of modulus, tensile, hardness and tear, and increase in elongation. In various of the compounds tested the physical properties on aging are greatly improved by the presence of the plasticizer. H. A. Winkelmann, Dryden, and R. E. Elliott, Standard Oil Co. (Indiana), Chicago.

Petroleum Softeners in Natural Rubber and GR-S-Natural Blends. The results of a softener study show the applicability of two distinct types of petroleum products as rubber compounding ingredients. Compounds containing smoked sheets, GR-S, and a blend of these polymers were investigated in a tire tread formulation. Data reveal that the petroleum plasticizers impart properties to the vulcanizates which are comparable to those obtained with pine tar.

Physical properties of the two petroleum oils employed in this study are given. Both products, one of which is a blended asphaltic-type softener, and the other a light bodied aromatic plasticizer, are fluid at room temperature and exhibit good wetting and pigment dispersing properties.

Laboratory evaluations of tensile properties, flex life and abrasion loss, and the resistance of these properties to oxygen bomb aging are reported. Williams plasticity and recovery data also appear.

Comparable results for such properties as tensile strength, modulus, elongation, Shore hardness, and permanent set are obtained for both pine tar and the petroleum plasticizers. Plasticity data indicate that while pine tar exerts a greater softening action on natural rubber than on GR-S stocks, both petroleum products studied show equivalent softening action on these polymers. In those compounds containing GR-S, generally better abrasion resistance is noted when petroleum softeners are employed; while slightly better abrasion resistance is observed in the pine tar-natural rubber combination. Pine tar imparts significantly better flex resistance to all the vulcanizates tested. P. D. Sharpe and E. P. Rittershausen, Socony-Vacuum Oil Co., New York.

[6] Present address: Paraffine Cos., Inc., Emeryville, Calif.

Chicago Technical Conference

THE Chicago Rubber Group and the Chicago Section, Society of Plastics Engineers, are two of the technical societies which will participate in the Chicago Technical Conference, to be held March 22 to 24 by the Chicago Technical Societies Council in connection with the annual Chicago Production Show.

The Chicago Rubber Group will sponsor two panel sessions on March 24 on the subject, "Engineering with Rubber," under the chairmanship of H. A. Winkelmann, Dryden Rubber Div., Shellmar Products Corp. At the first session B. F. Benson, Inland Rubber Co., will speak on "Tires of the Future," and Allyn I. Brandt, B. F. Goodrich Chemical Co., will discuss "American Oil-Resistant Rubbers." At the second session, Calvin S. Yoran, Brown Rubber Co., will treat of "Engineering with Sponge Rubber," and Fred J. Wehmer, Minnesota Mining & Mfg. Corp., will deal with "Engineering with Adhesives."

The Chicago Section, S.P.E., will sponsor a panel session on March 24 on "Plastics in Product Design," under the chairmanship of A. H. Voss, Western Electric Co. At this session J. A. Boyajian, Product Mfg. & Engineering Co., will discuss "Use of Plastics in Product Design as Used by the Engineer," and the topic of L. Morrison Willard, Jr., Montgomery Ward Co., will be "Use of Plastics in Product Design as Used by the Consumer".

In connection with the Production Show and Technical Conference, four members of the Chicago Rubber Group will appear as contestants on the Gordon Quiz Show over radio station WGN on April 11, at 2:30 p.m. The "quiz kids" will be William N. Crumpler, of George S. Mepham Corp., Bruce W. Hubbard, of Ideal Roller & Mfg. Co., Francis S. Frost, of Frost Rubber Works, and Dr. Winkelmann.

Carbon Blacks Discussed

CARBON black was the subject of a meeting of the Chicago Rubber Group on February 6 at the Morrison Hotel, Chicago, Ill. Speakers were J. W. Snyder, Binney & Smith Co., and H. A. Braendle, Columbian Carbon Co.

Mr. Snyder dealt with "The Fundamental Properties of Carbon Blacks" and showed some three-dimensional electron microscope pictures of various carbon blacks. The speaker reviewed the fundamental properties of carbon blacks, including surface area, pH, and reticulate chain structure. A thorough understanding of the relations involved gives the rubber compounder a better opportunity to make the best selection of black for each specific application, Mr. Snyder said.

"Compounding Aspects of Furnace Carbons" was the title of Mr. Braendle's talk. The development of fully reinforcing furnace carbons and their extension into tire tread use has for the first time challenged the dominant position of channel black for the reinforcement of natural and synthetic rubbers, he stated. This state of affairs has brought with it a need of re-examining established theories and practices of rubber compounding. The speaker reviewed some of the newer findings of the Columbian research laboratory and offered suggestions for the full utilization of the basic properties of furnace carbon blacks.

The Group's next meeting will be on March 26 at the Morrison Hotel. The speaker and his topic will be announced later.

Kemp Discusses Vinyl Isomerism

A. R. KEMP, of Bell Telephone Laboratories, was one of the speakers at a symposium on "Isomerism in Macromolecules" at the Institute of Polymer Research, Polytechnic Institute of Brooklyn, Brooklyn, N. Y., January 24. Mr. Kemp spoke on "Isomerism in Vinyl-Diene Copolymers." Other speakers at the symposium, under the chairmanship of M. L. Huggins, Eastman Kodak Co., were: C. S. Marvel, University of Illinois, on "Head to Head, Head to Tail Isomerism in Vinyl Polymers"; C. E. Schildknecht, General Aniline Corp., on "Isomerism of Polyvinylalkyl Ethers"; and H. Mark, of Brooklyn Polytech, on "Branching in Polycondensation and Polymerization Products."

New GR-S Numbers

UNDER date of November 17, 1947, the Office of Rubber Reserve announced that five experimental polymers have been changed to GR-S numbered polymers. These polymers, notice on which was just received, are as follows:

Former X-Number	New Designation	Remarks
X-250	GR-S-21	Stabilized and shortstopped with hydroquinone; contains no other antioxidant
X-317	GR-S-45AC	40-50 Mooney GR-S stabilized with EFED
X-369	GR-S-Black-20	Contains 55 parts HMF black
X-382	GR-S-18	GR-S-10 stabilized with Stalite
X-394	GR-S-20	Similar to GR-S-20AC, but with salt-acid coagulation

Mann and Fraser Speak before Record Akron Group

SEPARATE technical and dinner sessions, as employed by the New York Rubber Group, were used for the first time by the Akron Rubber Group for its meeting on February 6 in the Mayflower Hotel. The popularity of the separate session type of meeting was demonstrated by the largest attendance in the history of the Group, except for some of the summer outings. The recorded attendance at the dinner was 467 members and guests; while attendance at the technical session was well over 500. Because of the enthusiasm displayed, it is probable that a similar affair will be attempted by the Group next year. Arrangements for the meeting were handled by a committee composed of Robert H. Crossley, Caldwell Co., E. L. Stangor, E. I. du Pont de Nemours & Co., Inc., and Ralph F. Wolf, Columbia Chemical Division, Pittsburgh Plate Glass Co.

The technical session comprised two technical papers and panel sessions answering questions from the audience. Carey Mann, manager, Cleveland engineering department, Westinghouse Electric Corp., spoke on "Radio-Frequency Application in the Rubber Industry," and Donald F. Fraser, manager, rubber division, Monroe Auto Equipment Co., spoke on "Injection Molding of Rubber Goods." Written questions on radio-frequency applications, submitted in advance by the membership, were answered by a panel consisting of G. P. Bosomworth, Firestone Tire & Rubber Co.; H. J. Shively, The B. F. Goodrich Co., and H. R. Neighbours, United States Rubber Co. The panel on injection molding comprised Herman Boxser, Acadia synthetic products division, Western Felt Works; Howard M. Dodge, General Tire & Rubber Co.; John F. McWhorter, Ohio Rubber Co.; and James L. Woodruff, Gates Rubber Co.

Mr. Mann stated that acceptance of high-frequency methods by the rubber industry in this country dates only from 1944. He stressed the necessity of close attention to the type of ingredients and the thoroughness of their mixing in preparing rubber stocks for this type of cure. Mutual understanding of the problems involved by the equipment manufacturer and the user is essential to satisfactory evaluation of this new production tool. When adaptable to continuous processes, high-frequency curing often shows substantial savings over conventional curing methods because it eliminates intermediate handling operations. The speaker also discussed the complete equipment needed, the problem of handling energy radiations, and the problem of molds. He emphasized that molds must have electrical and thermal properties comparable to those of the material being molded, in addition to having sufficient mechanical strength to resist molding pressures. Finding satisfactory mold materials is still one of the biggest problems confronting the industry, Mr. Mann stated, although wood and impregnated glass fiber have been successfully used in low-pressure forms for mold foamed latex.

Mr. Fraser noted that the original equipment for injection molding rubber was developed by Chrysler Corp. and licensed in 1943 to Monroe Auto Equipment Co. for development and marketing. The major differences between this machine and an ordinary extruder are the use of a screw for churning and movement of the rubber stock, and the use of baffle gears which mesh with the screw and serve as mechanical pressure locks. Besides the machine the speaker also discussed in detail the design of molds, proper compounding of rubber stocks for use in this machine, and related topics. The use of this equipment is another step toward the "millless mill room," Mr. Fraser said, and he described the present layout at the Monroe plant where Banbury mixed compounds are pelletized and automatically conveyed to hoppers which feed directly into the extrusion machines.

Following the social hour and dinner, an interesting demonstration of modern methods of communication was given by engineers of the Ohio Bell Telephone Co., headed by G. F. Clark. The demonstration included the scrambling and unscrambling of speech, the transmission of speech by light waves through air and through solid plastic rods, the transmission of speech through hollow tubes instead of wires, and the use of throat and lip microphones.

The spring meeting of the Akron Rubber Group will be held on April 16 at the Mayflower Hotel. Joseph C. Thompson, Jr., assistant general paint manager of Pittsburgh Plate Glass Co., will speak on "Color Dynamics and Its Application to Industry," and Philip H. Wiegand, of the Pittsburgh Plate technical department, will discuss "Industrial Finishes and Finishing." The Group will hold its annual outing June 18 at Sandy Beach Park.

Tlargi Hears Milward

THE Los Angeles Rubber Group, Inc., met February 3 at the Mayfair Hotel, Los Angeles, Calif., with 210 members and guests attending. At the afternoon technical session under the chairmanship of George W. Miller, W. J. Voit Rubber Corp., John Milward, of William R. Thropp & Sons, spoke on "The Development of Safety Features for In-Running Rolls as Applied to Mills and Calenders for Rubber and Plastics." This talk was identical with that given by Mr. Milward before the January 29 meeting of the Northern California Rubber Group, reported elsewhere in this issue.

Will Rogers, Jr., was dinner speaker at the meeting and discussed "American Leadership in Europe." Mr. Rogers reported on his five-month tour of Sweden, Denmark, Holland, Belgium, France, England, Germany, and Spain. The speaker gave his impressions of conditions in each of these countries and showed how urgently American leadership was needed in the reconstruction of wartorn Europe.

At the business session, William E. Shawger, California Rubber Products, Inc., reported for the current events committee, and R. E. Bitter, B. F. Goodrich Chemical Co., reported for the yearbook committee in the absence of Chairman Leonard Boller, Technical Coatings, Inc. The 1948 Tlargi Yearbooks were distributed at the meeting and the book was acclaimed as one of the finest published by the Group to date. A report was also given by Murray Nixon, Goodyear Tire & Rubber Co., chairman of the auditing committee. A drawing for five door prizes donated by the Group was made with the following winners: electric clock, Wendell Higbee, Southwestern Rubber Co.; bridge set, John Hoenger, A. Schrader's Sons Mfg. Co.; gold cigarette case, Bill Biteman, Goodyear; pressure cooker, P. D. Radford, West American Rubber Co.; and wallet, H. Sear, Plastic & Rubber Products Co.

McColm on Natural Latices

THE Ontario Rubber Section, C. I. C., met on January 20 at the Hart House, University of Toronto, Toronto, Ont., Canada. Approximately 56 members and guests attended the meeting and heard E. M. McColm, technical director, plantations division, United States Rubber Co., speak on "Present Techniques and Future Possibilities in the Preparation of Natural Rubber Latices."

Most of the experimental work done in the past on the analysis of natural latex, and on the effects of variation in its constitution on its properties, has been concerned with the non-rubber constituents and their effect on latex and film properties, Dr. McColm said. No one has attempted to measure any variations in the fundamental properties of the hydrocarbon itself, and it is therefore not known whether or not all trees always produce exactly the same molecular size and configuration of rubber.

Natural latex, as it comes from the tree, contains natural rubber globules and is stabilized by a protein which resembles casein. Its lipin globules probably also contain carotene, and its aqueous phase contains certain salts, an antioxidant, 1-methyl inesite, a water-soluble mercaptobenzothiazole activator which is not proteinaceous, other minor substances including certain enzymes, and millions of bacteria which can multiply in a few hours to cause coagulation by acid formation. To remove the bacteria, a preservative is added to the latex at the earliest possible moment. Many preservatives have been studied, but the only ones which have been used in appreciable commercial quantities are the volatile gases, ammonia, and formaldehyde. In addition, ammonia also stabilizes the latex by raising its pH, deactivates the peroxidase which causes darkening of the latex surface on exposure to air, and also deactivates the "coagulase" present in latex. Concentration is the next step in latex treatment, and the speaker reviewed in detail the methods for making creamed and centrifuged latex.

If natural latex is to compete with synthetic latex 10 years from now, work must be done on the crude rubber hydrocarbon, Dr. McColm declared.

"The synthetic people regularly supply dry rubbers and latex of stated Mooney viscosity. We shall have to learn how."

The quality and the quantity of work being done on synthetic rubber and latex are such that a considerable additional amount of fundamental work must be done on natural latex. The speaker indicated some lines along which postwar research on the rubber hydrocarbon should be taken. He mentioned unpublished work carried out in the U. S. Rubber laboratories before the war where it was observed that if latex is treated with 2% potassium hydroxide and autoclaved for an hour at 10 pounds' steam pressure, the Mooney viscosity of the rubber, after five minutes' milling, is lowered about 12 points even though precautions are taken to prevent oxidation except during milling, and all non-adsorbed non-rubbers are removed.

On dry rubber the small amount of development done to date has been pointed toward lowering costs and improving appearance, Dr. McColm stated. Much could be done in improving the intrinsic properties, eliminating variability, and applying modern methods of washing, drying, and compounding. In the case of latex the ultimate aim of postwar research is to produce economically an emulsion of natural rubber of desired particle size, stabilized

by a known amount of a known emulsifier, and containing known amounts of a known stabilizer and antioxidant. Some private research is being conducted and more is planned, but the industry as a whole can be saved more surely if adequate public research is also carried on, the speaker said in concluding his remarks.

New Officers Installed

A TOTAL of 135 members and guests of the Southern Ohio Rubber Group attended a dinner-meeting February 20 at the Engineer's Club of Dayton. Guest speaker was Col. H. A. Toulmin, Jr., of Toulmin & Toulmin, patent counsels, who discussed "Making Profits from Patents." Colonel Toulmin reviewed the history of patent protection and gave the assemblage an excellent presentation of present-day patent procedure. Besides this talk a sound-color motion picture, "The Story of Neoprene," was shown through the courtesy of E. I. du Pont de Nemours & Co., Inc.

First item on the agenda at the business session of the meeting was installation of the Group's newly elected officers, as announced in our February issue, page 628. This was followed by the appointment of a committee to investigate sponsorship of the group by the Division of Rubber Chemistry, A. C. S., and by the announcement of meeting dates for the balance of the year. The Group will hold a spring outing and golf tournament on May 22, a technical meeting on September 17 at the Engineer's Club of Dayton, and a Christmas party on December 11 at the Miami Valley Golf Club.

Tours Vanderbilt Laboratory

THE winter meeting of the Connecticut Rubber Group on February 13 took the form of a tour and inspection of the R. T. Vanderbilt Co. laboratories at East Norwalk, Conn. Because of inclement weather and hazardous road conditions, only 50 members made the trip and viewed the different departments of the laboratory.

Each department was staffed by personnel who answered all questions and made any demonstrations that were necessary. The inspection tour was individual in nature and allowed the members to concentrate on those departments of special interest to themselves. The following were the laboratory departments visited and their features: ceramics department—kiln room, grinding room, exhibit of ores and minerals; latex department—grinding, mixing, and curing of dispersions, and preparation and testing of films; rubber department—Banbury room, mill and compound rooms, press room, proofing department, electrical laboratory, and preparation and testing of samples; paper department—paper laboratory, paper testing, and paper starch cooking equipment; paint department—paint and varnish making equipment and paint testing; foods department—foods laboratory and semi-automatic foods plant; and specialties department—general testing of soap, cosmetics, and insecticides, and small-scale pilot plant. The inspection tour was made possible by Gus T. Maasen, of Vanderbilt.

Discuss Mill Safety Appliances

THE Northern California Rubber Group held a dinner-meeting January 29 in the Claremont Hotel, Berkeley, Calif. The 50 members and guests who attended heard John Milward, sales manager of William R. Thropp & Sons, speak on "The Development of Safety Features for In-Running Rolls as Applied to Mills and Calenders for Rubber and Plastics."

Two main problems are involved, said Mr. Milward. One applies to preventing the operator from being caught in the bite of the rolls, and the second is to provide for emergency stopping of the rolls if an operator is caught in them. One of the few things specified in codes which has proved beneficial is the 40-inch minimum height from the floor to the top of the rolls. These codes also specify stopping distances in inches of roll travel. A 22-inch roll at 24 r.p.m. travels 27.5 inches per second. Since the National Labor Code specifies that such a mill must be stopped in 15 inches, there is therefore less than one second of time to stop the mill. Every refinement in safety equipment must be reviewed in terms of fractions of a second in order properly to evaluate its worth, the speaker emphasized.

The new-type Thropp mechanical brake seems to be the only presently known solution to shortest stopping distances. An analysis of the old-type external contracting drum brake, loaded by a weighted lever arm, showed that almost two-thirds of the time allowed to stop the mill was used up in applying the load to the brake. Development has now brought forth the internal expanding type of brake, with a spring loading device, which will stop a mill or calender in from one-third to one-half the time permitted by the National Labor Code. For example, it is now possible to stop the aforementioned 22-inch mill in four inches, rather than 15 inches. In addition, the shock loading caused by sudden stopping of the mill is only half as great with the new than with the older brake.

At the business session Group Chairman Ross E. Morris, of the Mare Island Navy Yard, announced the appointment of the following committee chairmen: prizes, Herman J. Jordan, E. I. du Pont de Nemours & Co., Inc.; current events, John Kirby, L. H. Butcher Co.; publicity, George Farwell, Goodyear Rubber Co.; membership, Joseph Hollister, also of Mare Island Navy Yard; summer outing, Bill Elwell, California Research Corp.; and Christmas party, W. D. Good, American Rubber Mfg. Co. J. C. Richards, Jr., B. F. Goodrich Chemical Co., spoke briefly urging every member of the rubber industry in the San Francisco Bay area to join the Division of Rubber Chemistry, American Chemical Society. D. C. Maddy, Harwick Standard Chemical Co., invited members of the Group to attend the regional meeting of the Rubber Division in Los Angeles in July and to present papers there.

Chicago TAPPI Meeting

THE Chicago Professional Paper Group, which is the Chicago Section of the Technical Association of the Pulp & Paper Industry, will hold a meeting on March 23 in the Chicago Bar Association Bldg., Chicago, Ill. The meeting has been scheduled as a special demonstration meeting to which visitors to the Chicago Production Show are invited. The program committee, under the chairmanship of Earl Lenz, has arranged a program on the general subject of "Developments in Coatings, Impregnants, and Saturants for Papers."

J. H. Carter, Nashua Gummed & Coated Paper Co., will discuss Heat-Seal thermoplastic papers and exhibit a small demonstration machine and samples of heat-treated papers. E. G. Partridge, American Anode, Inc., will speak on "Latex Compounds for the Paper Industry," assisted by R. T. Henson, also of American Anode. Mr. Partridge's talk will cover latex types, handling and compounding of materials, methods of application to paper, impregnation, saturation, coating, properties desirable and results obtainable, and specific commercial applications and problems.

"Thiokol" PR-1

THE quantity production of an improved oil resistant synthetic rubber, "Thiokol" PR-1, was recently announced by Thiokol Corp., Trenton, N. J. The new rubber is said to possess excellent resistance to solvents, greases, oils, and motor fuels and to have good resistance to compression set. It is also said to be ideally suited for the manufacture of molded goods in applications requiring resistance to solvents.

Since plasticizers are not required to impart low temperature resistance, cured "Thiokol" PR-1 stocks show zero to very low shrinkage in the low-swell gasoline and motor oils and are only slightly swelled by aromatic fuels. Such stocks show good dimensional stability whether used in aromatic fuels, alkylated fuels, or alternately in both. PR-1 stocks are flexible to at least —45° F. and can be used satisfactorily at temperatures up to 212° F. and above if resistance to compression set is not a primary factor. The rubber shows good resistance to cold flow at temperatures up to 150° F., but above this temperature shows some plastic deformation when held under sustained load. In addition PR-1 compounds display good aging characteristics and good resistance to sunlight and ozone. The company has issued a six-page bulletin covering the general properties, solvent resistance, compounding, typical compounds, mixing, and curing of "Thiokol" PR-1.

SAE Detroit Meeting

THE first postwar national passenger car and production meeting of the Society of Automotive Engineers will be held March 3 to 5 at the Book-Cadillac Hotel, Detroit, Mich. According to John A. C. Warner, secretary and general manager of the Society, 16 technical papers will be presented by outstanding automotive engineers. The opening session will be on brakes, and W. R. Rodgers and J. V. Hendrick, of Chrysler Corp., will report on production methods for bonding brake lining to shoes with a synthetic resin and synthetic rubber compound, a development said to increase lining life and eliminate the use of rivets. In addition T. P. Chase, of research laboratories division, General Motors Corp., will present a paper on automobile brake performance limitations and future prospects. Mr. Chase is chairman of the SAE brake committee, now busy on a coordinated research on improving the effectivness of brakes.

RUBBER WORLD
NEWS of the MONTH

Highlights—

Of the several bills that have now been introduced in Congress on rubber policy, the bill of Senator Bricker of Ohio seems to be the only one to have the approval of a majority of the rubber industry. Cutbacks in the production of tires and sales and heels because of reduced demand have occurred, but other branches of the industry continue at a record-breaking rate. Output for the entire industry including the tire and sole and heel branches is expected to be higher in 1948 than during any prewar year, in spite of present or any future temporary slackening of demand. The Federal Trade Commission issued a "cease and desist" order to The Rubber Manufacturers Association, the Rubber Heel & Sole Manufacturers Association, and their manufacturer-members, with respect to pricing sole and heel products. The URWA has asked the rubber industry for a 30¢-an-hour wage increase, part of which is to be set aside for retirement and health and hospitalization programs. Negotiations on this matter are not expected to begin for at least 60 days.

Additional Rubber Legislation Presented; Industry Production Lower in Tire and Sole and Heel Branches

During the last few weeks activity in the field of legislation on rubber took the following course. On January 29, Rep. Lyndon B. Johnson of Texas introduced a bill on rubber policy, which, after discussion by the House Armed Services Subcommittee, was incorporated as a part of a second bill submitted by Rep. Paul Shafer of Michigan. Agreement of the full House Armed Services Committee was reported on February 18, and early passage of this bill by the House is considered likely. Industry spokesmen criticized this Shafer Bill strongly. Senator John W. Bricker of Ohio presented his bill to the Senate on February 20, and the Senate Banking and Currency Subcommittee headed by Senator Bricker started hearings on rubber legislation on February 24. Industry comment on the Bricker Bill was favorable.

The production rate in the tire and sole and heel branches of the industry has fallen off somewhat during the past month because of a slackening of demand for these products. Other branches of the rubber industry do not show any indication of a similar trend toward lower production rates. In fact, tire and sole and heel manufacturers expect the 1948 output to be greater than any prewar year regardless of this or any future temporary lull.

Low temperature GR-S became an increasingly important factor in the news as statements on the value of this new-type synthetic rubber from the Phillips Petroleum Co., the Copolymer Corp., and the United States Rubber Co., appeared in the public press.

Rubber Legislation

Since the introduction of the first Shafer Bill on rubber policy (H. R. 5007) in the House of Representatives on January 19, a second bill was offered by Representative Johnson (H. J. R. 313) on January 29; the Shafer House Armed Services Subcommittee met in executive session on February 2, and, finally, a second Shafer Bill (R. H. 5314) containing new amendments to the first bill was favorably reported by the Subcommittee. Unanimous approval of the second Shafer Bill by the full House Armed Services Committee was reported on February 18, and passage of the bill before the end of the month was predicted.

The bill of Representative Johnson had as its major purpose the prohibition of the disposal of any of the government-owned synthetic rubber plants until at least March 31, 1950. The feature was written into the second Shafer Bill as an amendment, permitting consideration of sale or lease proposals for government rubber facilities only when "requirements of national security and common defense will be facilitated and advanced by such proposed disposition." Mr. Shafer's original bill required the National Security Resources Board to find only that "adequate safeguards for national security and consumers of American-made rubber" were evident and "such disposition is consonant with the requirements of national security and common defense." The amendment requires that an "affirmative finding" by a majority of the National Security Resources Board be submitted for Congressional approval before a plant can be sold or leased.

The second Shafer Bill carries a section on patent pooling which authorizes the President to negotiate modifications of the wartime patent pooling and use of technical information agreements so as to permit private companies to secure patents for their own benefit on future synthetic rubber inventions. New patents must be available to the government on a license basis at a reasonable cost.

Another new section of the latest Shafer Bill states, "The President shall report to the Congress within five years from the effective date his recommendations for revisions of this Act, particularly as to any changes in the mandatory annual tonnage consumption, and the rated production capacity of rubber-producing facilities which must be maintained in the United States."

The bill continues to call for the compulsory annual consumption of 200,000 tons of general-purpose chemical rubber and 25,000 tons of special-purpose chemical rubber, of which 15,000 tons are to be a type "suitable for use in pneumatic inner tubes." Standby and production facilities to be maintained total 600,000 of general-purpose chemical rubber and 75,000 of special-purpose chemical rubber, of which 45,000 tons of the latter shall be of the inner tube type.

Industry Comment

John L. Collyer, president of The B. F. Goodrich Co., in a statement last month criticized the Shafer Bill because it "applies permanent socialized control to what should be a free, competitive industry." The permanency of government controls is permitted by the failure of the proposed legislation to state a termination date for its provisions, he declared. The bill contains some constructive provisions, Mr. Collyer said, but since it specifies no termination date, "it is, in effect, permanent legislation and it contains certain provisions for government regulation that I believe Americans would not endorse on any long-term or permanent basis."

A national rubber program should provide interim government participation in the American rubber field only to the extent essential to military security in rubber, he said. Legislation to be terminated in two years would be sufficient to insure such security, he added.

Herbert E. Smith, president of U. S. Rubber, also criticized the Shafer Bill during February. In a letter to Representative Shafer, Mr. Smith charged that the government is attempting to force synthetic rubber down the throat of the American consumer by perpetuating control over the rubber industry.

"It is recognized this bill is offered in the name of national security," Mr. Smith wrote. "The position of our company has been, now is, and always will be to put national security first. But national security changes as the quality of synthetic rubber changes and as the international scene changes. Compulsory use of synthetic rubber should have a definite termination date—and reasonably soon. The bill places an Act on the statute books without termination date.

"The bill is written to perpetuate government control over the rubber industry, our company, and the American consumer. It perpetually controls and regulates rubber production and manufacture. It obstructs progressive improvement in quality and reduction in cost under our American system of free, competitive enterprise.

"It threatens the freedom of private and corporate citizens alike. For the first time in our country's history, the American consumer faces a situation where a given product is forced down his throat.

"And it may be forced down at a high price, for the bill fails to provide a pricing policy. Both the industry and the consuming public are wholly in the hands of the government. Under this bill, there is no way of knowing what the American citizen would have to pay for tires, rubber footwear, foundation garments, hot water bottles, golf balls, and hundreds of other products which are an important part of his every-day life."

Mr. Smith also charged that the proposed legislation grants sweeping powers.

"It authorizes the President to exercise allocation, specification and inventory controls of natural rubber and synthetic rubber and products containing natural rubber and synthetic rubber, notwithstanding any change in the supply or estimated supplies," he continued.

"Thus the industry is completely controlled by the government. Any manufacturer can be told how much natural rubber he can have in his inventory and precisely how much he can use in any specified product he makes."

Mr. Smith stated that in testimony before the House Armed Services Subcommittee in December, 1947, his company recommended government operation of the synthetic rubber plants for another year, until March 31, 1949.

"This advice was based solely on consideration of national security, since we felt that immediate transfer of the plants to private industry might delay the stockpiling of natural rubber.

"At the present rate of production it is believed that the necessary stockpile of natural rubber can be accumulated by March 31, or certainly by June 30, 1949.

"When national defense needs of natural rubber have been provided for, government production of rubber should be discontinued by sale of facilities to private enterprise or by placing of plants in standby condition.

"Research, development, and manufacture of synthetic rubber should then be turned over to private enterprise—the only economic system which assures the consumer the best possible product at the lowest possible price."

Lockwood Report Comments

Lockwood's *Rubber Report* for February 15 was also critical of the Shafer Bill (H. R. 5314).

"We do not like the bill's inroads on the freedom of international trade. We do not like the implied acknowledgment that, in rubber, in peacetime, free enterprise cannot be trusted. We do not like the extraordinary powers granted to the President, under which, in the name of national security, almost any given production of synthetic rubber would be possible by administrative action," it was stated.

"*But*, far and away the most dominant issue, is the *lack of a termination date.*

"The theory that once the bill becomes law, when conditions change, the law can be changed, is fine. But try and change it," it was added.

It was further stated that if a two-year time limit were included, the rest of the provisions of the bill could be tolerated.

Passage of a compromise bill before April 1 after a conference between the House and Senate committees was predicted unless a stalemate developed on the termination date and other issues.

Bricker Bill and Senate Hearings

On February 20, Senator Bricker introduced a bill in the Senate (S. 2187) called the "Rubber Act of 1948." This bill stated that "the security interests of the United States can and will best be served by the development within the United States of a free, competitive synthetic rubber industry to be served by private research and development. In order to accomplish security through a sound industry it is essential that all government ownership of production facilities, all government production of synthetic rubber, all regulations requiring mandatory use of synthetic rubber, and all patent pooling should be ended and terminated at the earliest practical date consistent with national security".

The Bricker Bill has a termination date of June 30, 1950. The President is authorized to exercise allocation, specification, and inventory controls of synthetic rubber and products containing natural rubber and synthetic rubber in transportation items, but the percentage of synthetic rubber to be used is not fixed. Maintenance of a production capacity of 600,000 long tons of general-purpose synthetic rubber and 65,000 long tons of special-purpose synthetic rubber, of which 45,000 long tons shall be of the type suitable for use in inner tubes, is required.

Research and development by the government is provided for, and the President is "authorized and directed" to take such action as may be appropriate with respect to patent pooling, patent licensing, and exchange of information agreements and to effectuate immediate cessation of further accumulation of technical information or rights to patents under the agreement dated December 19, 1941, as supplemented June 12, 1942, between the government and others.

Disposal of synthetic rubber plants to private industry is recommended if a study of this problem to be reported to the President and Congress by April 1, 1949, is favorable. Standby plants may be disposed of at once if the purchaser agrees not to use the rubber produced to satisfy the demands of mandatory consumption.

The bill further states that "the price at which synthetic rubber and component materials are sold . . . shall be determined on a basis which will return the entire cost of manufacture and distribution without loss to the United States. The department, agency, . . . authorized to make such sales shall make a semi-annual report of operation of government-owned facilities to the President and Congress, disclosing the accounting methods used to establish its selling price for the type of synthetic rubber." This provision results from the controversy over pricing procedure between the industry and Office of Rubber Reserve.

Industry comment on the Bricker Bill was generally favorable during the hearings before the Bricker Senate Banking and Currency Subcommittee, held February 24 through 26. The first day's witnesses included Harvey S. Firestone, Jr., chairman of the board, Firestone Tire & Rubber Co.; J. P. Seiberling, president, Seiberling Rubber Co.; and J. W. Keener, Goodrich vice president.

The industry's position on the House and the Senate measures was also given by A. L. Viles, RMA president, who said the industry committee of the Army and Navy Munitions Board "unanimously indorsed" the Senate bill, S-2187, with the following changes:

1. Require the Administration to report a disposal program for government-owned synthetic rubber facilities by January 1, 1949, nine months after the effective date of the act and four months earlier than the bill now provides.

2. Terminate the government's role in synthetic rubber on June 30, 1949. George M. Tisdale, vice president of U. S. Rubber, said that the government stockpile of natural rubber should be accumulated or available by that date.

3. Restrict government authority to impose specification controls to tires, camelback, and flaps.

4. Make certain that any of the 600,000 tons of GR-S capacity held by the government until June 1949, is used for synthetic rubber if leased to private interests before that date.

Mr. Firestone said the Senate bill with the RMA amendments "meets in a practical manner the problems with which we are confronted." The bill seeks to stop further patent pooling and exchange of information agreements which "makes the furthering of the rubber industry impossible."

William O'Neill, president, General Tire & Rubber Co., declared, "It's absurd to think of the government spending money on the rubber industry now . . . S. 2187 is American . . . This is the first time I have ever found the rubber industry together, unanimously for the Senate bill, unanimously opposed to the House bill."

In commenting on the Senate bill, Mr. Seiberling stated, "The effect of the lease provisions and the clauses to protect small manufacturers is a most important step in the right direction. The effect is to give private industry, in a way harmless either to national security or to the principles of fair business practice, an opportunity to develop a 'free, competitive synthetic rubber industry' that will bridge the present gap between government-owned and privately-owned facilities."

William Welch, president, Midwest Rubber Reclaiming Co., speaking for the reclaimed rubber industry, indicated his complete approval of the Senate bill as recognizing the evil of regimentation and his disagreement with the House bill as recognizing every type of regimentation.

Everett Morss, president, Simplex Wire & Cable Co., also said he heartily endorsed the Senate bill: "It represents a chance to make a beginning to develop a better polymer than GR-S."

Robert S. Wilson, executive vice president with Goodyear, stated, "The Senate bill with the industry committee's modifications protects national security, free enterprise and the consumer and we, therefore, support the bill."

The House Armed Services Committee on February 25 further modified its bill to make it more acceptable to the rubber industry. Representative Shafer said the termination date of June 30, 1950, would be included in the House bill. It was reported that the Administration still favors the House bill instead of the Senate bill and that an administrative committee is expected to present its views on the Senate bill in a few days.

Industry Output Down

High-level production in the rubber industry is showing signs of reduction. The trend is not general, and some branches of the industry have eased off more than others. Manufacturers of soles and heels shifted to a five-day week in January. As an indication of the cause for this smaller demand, it has been estimated that shoe manufacturers will produce 50,000,000 less pairs of shoes in 1948 than they did in 1947. Sole and heel replacement business is expected to remain about the same.

Sharp cutbacks of tire production occurred during February, particularly in the second week. The current cutbacks are sharper than expected, but are greatly overdue, according to industry experts. Many tire plants in Akron, where the six-day week and the six-hour day are prevalent, are working only five days a week, and layoffs have been reported at the various plants, but the number involved has been small. Slackening of tire demand is attributed to several factors: the seasonal slump in January and February materialized later than usual, bad weather forced a reduction in automobile production, and many tire dealers built up large inventories late in the fall in anticipation of price increases. Demand may increase in April, with improving original equipment and replacement business. In any event, tire manufacturers expect that tire production in 1948 will be higher than in any prewar year. The new low-pressure and tubeless tires should act as a stimulus to both original and replacement tire demand.

According to the regular monthly report of The Rubber Manufacturers Association, production of automobile tires for 1947, which totaled 95,548,391 units, topped by 13,250,210 units the production figures for 1946, which was in itself a record

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◆

FF (Fine Furnace)
STATEX-B

◆

VFF (Very Fine Furnace)
STATEX-K

◆

FEF (Fast Extruding Furnace)
STATEX-M

◆

SRF (Semi-Reinforcing Furnace)
FURNEX

◆

COLUMBIAN CARBON CO. MANUFACTURER

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year. Shipments during 1947 reached 91,194,274 casings, an increase of almost 11% over the previous year. Full details of the production and shipments of passenger, truck, and bus tires and tubes are given on page 814.

The mechanical goods division of the industry has no indication of a slackening of the demand for its products. The backlog of orders for all kinds of belting is still large, and although the demand for some types of hose is a little less, mechanical goods manufacturers expect to equal their 1947 production rate throughout 1948. About 30 million pounds of latex foam rubber were produced in 1947, and this year the output is expected to total 50 million pounds. With lower latex and manufacturing costs, a yearly production of 100 million pounds of latex foam is estimated for the future.

Manufacturers of rubber footwear have enjoyed a high demand for their products during the course of the winter months. Now that the end of a rather bad winter is in sight, this demand will drop, but as the market for rubbers and overshoes declines, the market for canvas footwear builds up, and footwear manufacturers expect to maintain a fairly high level of production of all items throughout the year.

No significant reduction in demand is reported from the coated fabrics branch of the industry. Manufacturers of these products would like to see lower fabric prices and better availability of synthetic rubber, but, in general, they have been able to produce at a rate about equal to the high-level consumer demand.

All manufacturers of rubber goods are affected by the amendment to Rubber Order R-1 instituting allocation control over GR-S again because of the tight supply problem. Because industry firm orders amount to 40,000 tons a month, and production of GR-S is only 30,000 tons a month, the United States Department of Commerce resumed allocation of GR-S as of February 14. These allocations will be based on specification and technical requirements rather than on the purely mathematical considerations which have ruled in the past. Consumption during the first quarter of 1948 will be limited to 73,000 tons for transportation items and 20,000 tons for voluntary requirements.

The report of the Office of Materials Distribution, Department of Commerce, on consumption, distribution, and stocks of rubber showed consumption of rubber according to type for December and for the year 1947 (preliminary figures) as: natural, 56,321 long tons (including 1,816 tons' dry weight of latex) and 562,698 tons (including 13,859 tons' dry weight of latex): GR-S, 34,626 and 448,565 tons; neoprene 2,680 and 37,650 tons; Butyl, 5,404 and 68,829 tons; and nitrile types, 420 and 4,522 tons, respectively.

New supply and production for the same periods were: natural, 68,391 tons (including 2,279 tons' dry weight of latex) and 685,331 tons (including 17,675 tons dry weight of latex); GR-S, 29,553 and 407,769 tons; neoprene, 2,907 and 31,495 tons; Butyl, 5,622 and 62,824 tons; and nitrile types, 507 and 6,618 tons.

Stocks on hand at the end of 1947 were: natural, 129,255 tons (including 4,937 tons' dry weight of latex), GR-S, 38,110 tons; neoprene, 5,215 tons; Butyl, 13,216 tons; and nitrile types, 3,380 tons.

Low-Temperature Rubber

Information on a new type of GR-S rubber with properties better than any GR-S produced to date and equal or superior to natural rubber, has become generally available during the last two months. The contribution of the Phillips Petroleum Co. to the development of this new rubber was described briefly in our January issue, page 508, and a detailed technical article on Philprene A and B appears on page 739, this issue.

At the symposium of the Chemical Engineer's Club of Washington, D. C., held in that city on January 13 and reported on page 626 of our February issue, John P. Coe, of U. S. Rubber, provided further information on the development and plans for the production of GR-S polymerized at low temperatures at the government plant operated by that company at Borger, Tex.

The New York Times on February 12 and *The New York Journal of Commerce* on February 13 carried stories on the activities of the Copolymer Corp., with low-temperature GR-S rubber. This organization, which consists of a group of rubber companies combined to operate a government synthetic rubber plant at Baton Rouge, La., includes the following companies: Dayton Rubber Co., Gates Rubber Co., Armstrong Rubber Co., Inland Rubber Co., Lake Shore Tire & Rubber Co., Lee Tire & Rubber Corp., and Mansfield Tire & Rubber Co. This type rubber is identified with the name Ultipara, and it was stated that proving ground tests and those conducted independently by the participating companies in the Copolymer Corp. project show conclusively that low-temperature rubber is superior to natural rubber in truck and passenger tire treads in all major respects. The production method for low-temperature GR-S uses different modifying and reducing agents coupled with low as opposed to the hitherto relatively high polymerization reaction temperatures and is controlled by the government agency, Office of Rubber Reserve, RFC.

FTC Actions

The Federal Trade Commission during February in connection with its investigation of pricing in the tire manufacturing industry, ordered U. S. Rubber, Firestone, Goodrich, and Goodyear Tire & Rubber Co. to file reports on: (1) The total number of purchasers to whom each company sold tires or tubes, or both, during the year January 1 to December 31, 1947, exclusive of federal and state governments and agencies and political subdivisions thereof, and purchasers from its retail stores and the total net dollar sales of tires and tubes during that year, again exclusive of federal and state governments, etc. (2) The name and address of each purchaser, exclusive of federal and state governments, to whom its total net dollar sales of tires or tubes, or both, during the year 1947 amounted to $100,000 or more, and with respect to each purchaser so named, its total net dollar sales to him for that period. Also, all price lists, discount sheets, contracts, agreements, or any other documents which provided the basis for the prices to each purchaser named in response to (2).

The Commission asked for the data by February 24. Under the existing law the Commission can impose a limit on sales if it feels price discounts given larger purchasers tend to discriminate against small concerns and promote a monopoly.

Also in February, the FTC ordered the RMA together with George Flint, chairman, and 12 manufacturer-members of its Heel & Sole Division; Rubber Heel & Sole Manufacturers Association, as well as its 16 members; and Cat's Paw Rubber Co., Inc., to cease and desist from a nation-wide combination and conspiracy to fix and maintain prices for their products. The order specified, however, that the companies still are free to enter into the type of resale price maintenance contracts allowable under the Miller-Tydings Act.

Labor News

A meeting of the international policy committee of the United Rubber Workers, C.I.O., in Cleveland, O., early in February voted to ask the rubber goods manufacturing companies for wage increases aggregating 30¢ an hour. Part of the increase is for the establishment of welfare funds, insurance, hospitalization, sickness and accident and retirement programs. The major part of the increase is to put wages on a par with the present cost of living, it was said. Three local unions at plants of the General Tire & Rubber Co., in Akron, O., Jeannette, Pa., and Waco, Tex., plan to approach the management of that company for a uniform contract to cover working conditions at all three plants. Work stoppages occurred at the plants of the Firestone Tire & Rubber Co. and the Goodyear Tire & Rubber Co., in Akron, during the month.

URWA Wage Demand

Although its demand for a wage increase of about 30¢ an hour, decided upon by a meeting of the policy committee of the URWA in February, was not expected to reach the negotiating stage for two or three months, the majority decision of the union for an increase to meet the increased cost of living and provide for retirement and hospitalization was recorded. Under existing contracts, most companies have a requirement that notice for reopening of negotiations on the wage question must be filed 60 days in advance of actual bargaining. Also the URWA is likely to wait until a national pattern of wage increases is set by the United Steel Workers and the United Auto Workers, other major CIO unions.

In the absence of official comment from any of the Big Four or other companies, it is understood that the 30¢ figure is considered as very much too high. It was indicated that any wage increase, if absolutely necessary, would have to be for an amount that would not necessitate any price increases for rubber products. Other factors likely to influence negotiations for a wage increase are any decline in the cost of living and a downward trend in employment in the industry as tires and other rubber products exceed market demand.

Miscellaneous News

The employes at the three plants of General Tire, in Ohio, Pennsylvania, and Texas, have expressed themselves in favor of a company-wide contract to cover working conditions at these plants.

A dispute over the piece-work rate for the new low-pressure tires resulted in a work stoppage at the Akron plant of the Firestone Company in mid-February. A total of 3,500 workers were made idle. The union officials urged the workers to return to their jobs while the dispute was discussed with the company. Management of the company took the position that there was no excuse for the stoppage since the union contract provided a grievance procedure for such matters.

As the result of a sitdown strike by the workers in a tire building room at the Goodyear plant in Akron, the company

suspended 79 of these workers for one week early in February. The sitdown was staged as a protest of the discharge of a fellow worker, it was said. Company officials declared the strike was in violation of a grievance procedure in the contract with the union.

Controls Resumed over GR-S

Resumption of control over the distribution of general-purpose synthetic rubber (GR-S) by the Office of Materials Distribution was announced February 13 by the United States Department of Commerce. This control was dropped by OMD last July, since which time the Office of Rubber Reserve, Reconstruction Finance Corp., has distributed GR-S by controlled sales.

The latest action is in line with recommendations made by the Rubber Industry Advisory Committee, at a meeting with OMD officials in January. Earl Glen, chief of OMD's Rubber Division, said the authority for allocation and other controls over natural and synthetic rubber rests by statute, with the Department of Commerce, and that it was obligatory on the Department to resume direction of distribution, in view of shortages of GR-S synthetic rubber which have existed since November. When OMD dropped its allocation controls last year, Mr. Glen declared, the rubber industry was expecting a lessening of demand, which, however, did not materialize.

The allocation procedure provided for in the amendment of Rubber Order R-1 does not call for any change in the ORR's purchase procedure or "firm commitment" plan and will not require original application to OMD for authority to purchase.

The fourth quarter of 1947 will be used as the base period for determining allocations to manufacture. About 73,000 tons of GR-S will be earmarked for distribution during the first quarter of 1948 to manufacturers of transportation items, principally tires, in which specified percentages of synthetic rubber must be used. Quantities to be allocated, Mr. Glen explained, will be sufficient for manufacture during the quarter of up to the same number of transportation items as were turned out in the base period, provided a manufacturer's demonstrated use calls for them. No allocation will permit an inventory of finished goods in excess of 20 days' supply.

A balance of about 20,000 tons of GR-S expected to be available for distribution during the quarter, after the set-aside for transportation items, will be allocated for other products. This rubber will be distributed among manufacturers who need GR-S because of technical difficulties in using natural rubber and those who prefer to use the synthetic. Both of these groups are described as "voluntary" users of synthetic rubber, since no government-set specifications apply to their products.

Each manufacturer of non-transportation products who establishes a hardship case resulting from technical difficulties in the use of materials other than GR-S will be granted sufficient synthetic to produce substantially the same quantity of such products as he turned out during the base period.

A final distribution of any GR-S remaining unallocated then will be made to all manufacturers of non-transportation items who prefer to use the synthetic. This distribution will be based on the ratio which the percentage of each manufacturer's voluntary consumption in the base period bears to the total voluntary consumption over that time.

Other minor changes effected by amendment of R-1 change passenger tire and tube size references to correspond with new tire designations, and increase from 50 to 66 2/3 % the amount of natural rubber latex, by weight, in latex foam seat cushion topper pads 2½-inch average thickness or less.

CALENDAR

Mar. 1-31.	Red Cross 1948 Fund Appeal.
Mar. 1-6.	A.S.T.M. Committee Week. Washington, D. C.
Mar. 2.	Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
Mar. 8-20.	Toy Fair, New York, N. Y.
Mar. 9.	New York Section, S.P.E. Ritz Carlton Hotel, Montreal, P. Q., Canada.
Mar. 9-10.	Commercial Chemical Development Assn. Annual Meeting. Hotel Roosevelt, New York, N. Y.
Mar. 10.	Newark Section, S.P.E. Newark Athletic Club, Newark, N. J.
Mar. 10.	Rhode Island and Southeastern Massachusetts Section, S.P.E.
Mar. 11.	Quebec Rubber & Plastics Group.
Mar. 16.	Rochester Section, S.P.E.
Mar. 19.	Boston Rubber Group. Spring Meeting. Somerset Hotel, Boston, Mass.
Mar. 22-24.	Chicago Technical Societies Council. Chicago Technical Conference and Chicago Production Show.
Mar. 26.	Chicago Rubber Group. Morrison Hotel, Chicago, Ill.
Mar. 28-31.	West Coast Section, S.P.I. Annual Conference and Exhibit. Hotel Biltmore, Santa Barbara, Calif.
Apr. 2.	New York Rubber Group. Henry Hudson Hotel, New York, N. Y.
Apr. 3-10.	National Baseball Week.
Apr. 5.	Rochester Section, S.P.E.
Apr. 6.	Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
Apr. 7-9.	Midwest Power Conference. Sheraton Hotel, Chicago, Ill.
Apr. 8.	Quebec Rubber & Plastics Group. Ritz Carlton Hotel, Montreal, P. Q., Canada.
Apr. 13-15.	SAE National Aeronautic and Air Transport Meeting. Hotel New Yorker, New York, N. Y.
Apr. 14.	Newark Section, S.P.E. Newark Athletic Club, Newark, N. J.
Apr. 14.	Rhode Island & Southeastern Massachusetts Section, S.P.E.
Apr. 16.	Akron Rubber Group.
Apr. 19-23.	American Chemical Society. Spring Meeting, Chicago, Ill.
Apr. 26-29.	American Management Association. Conference on Packaging, Packing, and Shipping and Seventeenth Annual Packaging Exposition. Cleveland, O.
May 4.	Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
May 7.	Chicago Rubber Group. Morrison Hotel, Chicago, Ill.
May 7.	American Institute of Chemists. Annual Meeting. Waldorf-Astoria Hotel, New York, N. Y.
May 8-15.	National Golf Week.
May 12.	Newark Section, S.P.E. Newark Athletic Club, Newark, N. J.
May 12.	Rhode Island and Southeastern Massachusetts Section, S.P.E.
May 13.	Quebec Rubber & Plastics Group. Ritz Carlton Hotel, Montreal, P. Q., Canada.
May 14.	Connecticut Rubber Group.
May 18.	Rochester Section, S.P.E.

National Bureau of Standards, Washington 25, D. C., through Director E. U. Condon, has announced the appointment of Paul V. Horton to the engineering electronics section, ordnance development division. Mr. Horton will work on the formulation, development, evaluation, and utilization of new and improved plastics and other non-metallic materials that may be of use in the work of the section, which conducts the Bureau's work in applied electronics, covering electronic apparatus, instruments, processes, and control. A graduate of the University of Arkansas in 1928 and holder of an M.S. degree from Ohio State University in 1935, Mr. Horton was plant chemist at American Rubber Co. from 1929 to 1942. From 1942 to 1944 he was a consultant at Johns Hopkins University on chemical problems pertaining to plastics and rubber and then was a chief chemist for the Plax Corp. Mr. Horton also held positions with United States Rubber Co. and Rub-Tex Products Co.

A. G. Spalding & Bros., New York, N. Y., recently established new and larger quarters at 401 Broad St., Philadelphia, Pa. Amos Williams is Philadelphia district manager.

PACIFIC COAST

Kirkhill Rubber Co., Los Angeles 37, Calif., has appointed W. J. Haney general manager and Willys Blount factory manager.

Lamb Rubber Corp., 801 Milford St., Glendale 3, Calif., according to President Charles A. Lamb, has appointed Harold Rowntree a salesman. Mr. Rowntree was formerly purchasing agent for Joshua Hendy Co. Lamb Rubber is now engaged in the manufacture of golf balls in addition to the oil field supplies, sporting goods, and rubber bonded abrasives.

American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., has acquired S. T. Dahl Co., Los Angeles, Calif., along with its personnel. Sheldon T. Dahl has been appointed West Coast sales manager for the industrial chemicals and plastics division of American Cyanamid. An office and warehouse have been opened at 2472 E. 8th St., Los Angeles 21. Mr. Dahl's company had been sales agent for the industrial chemicals division of American Cyanamid since 1925 and represented the plastics division on the West Coast for the past several years. Mr. Dahl and two of his associates, H. G. Pratt and J. Wyckoff, are plastics experts, well qualified to provide technical service on thermosetting molding materials, resin adhesives, and laminating resins.

EASTERN AND SOUTHERN

Sporting Goods Convention

The seventeenth annual convention of the National Sporting Goods Association was held on February 1 to 6 at the Hotel New Yorker, New York, N. Y. As in the previous show, some 400 manufacturers and distributers had exhibits on seven floors of the hotel in addition to the mezzanine and ballrooms. An estimated attendance of more than 4,000 retail buyers viewed the show in anticipation of a $500,000,000 sporting goods market this year. Prices averaged 5% to 10% above those of last year. The supply situation was said to be more nearly normal than at any time since the war, and nearby deliveries were available on most items.

As usual, rubber items occupied a prominent place at the show. In addition to its standard use in rubber balls, inflatable ball bladders, golf ball centers, and swimming aids, rubber displayed its sweeping popularity for all types of playground balls. For the first time all exhibits of inflatable balls featured rubber-covered basketballs, footballs, volley balls, softballs, and other playground balls.

Full lines of natural rubber and neoprene ball bladders were shown by Seamless Rubber Co. and Dewey & Almy Chemical Co., respectively. Golf balls with rubber centers were exhibited by Burke Golf, Inc., Golf Products Corp., Golfcraft, Inc., MacGregor Golf, Inc., McDonald & Son Golf Ball Co., Montgomery Golf Ball Co., and Worthington Ball Co. Worthington also displayed its new Les Strokes golf ball, having an oversized rubber center, which is said to be livelier and to carry farther than the standard golf ball.

Rubber and rubber-bearing boots and shoes were shown by Acme Boot Mfg. Co., Inc., Athletic Shoe Sales Co., Arnoff Shoe Co., Inc., Beacon Falls Rubber Footwear Co., Boston Athletic Shoe Co., Brooks Shoe Mfg Co., Converse Rubber Co., Gillis Shoe Corp., Gotham Shoe Mfg. Co., Hyde Athletic Shoe Co., Indian Head Shoe Co., Inc., and Wisconsin Shoe Co. Proofed goods, including rubberized clothing, tents, mattresses, etc., were displayed by Hodgman Rubber Co., K & W Rubber Corp., New York Rubber Corp., and Sun Tent-Luebbert Co. Hodgman also featured its new Circo-Swing golf jacket and an improved line of wading boots.

All-rubber, tennis, and inflated balls of all types were displayed in the exhibits of Benlee Sport Sales Co., Dubow Mfg. Co., Everlast Sporting Goods Mfg. Co., Ken-Wel Sporting Goods Co., MacGregor-Goldsmith, Inc., Ohio-Kentucky Mfg. Co., Pennsylvania Rubber Co., Rawlings Mfg. Co., Seamless Rubber Co., Sun Rubber Co., A. G. Spalding & Bros., Inc., W. J. Voit Rubber Corp., Weaver-Wintark Sales Co., and Wilson Sporting Goods Co. Pennsylvania showed a new rubber-covered football, a new handball, and a new line of inflated rubber beachballs. For the first time Seamless exhibited its new tennis and golf balls, besides its standard balls. A rubber utility ball containing several small bells for use by blind children was shown by Voit, in addition to a new tether ball and an all-position football kickoff tee.

Full lines of rubber fins, mittens, goggles, and other swimming aids were exhibited by Churchill Mfg. Co. and by Sea-Net Mfg. Co., who also displayed its new Sea-Dive swim flippers. Miscellaneous displays included those on rubber tapes and trainers' bandages by Johnson & Johnson and Seamless Rubber, a full line of rubber goggles by New York Eye Protection Corp., and a new inflatable Flo-Ting swim cap for children, by Rainford Products, Inc.

Plastic items of all sorts were also well represented at the show. Besides uses in game sets and novelties, vinyl plastic beachballs, mats, water wings, and toys were exhibited by Detroit Plastic Engineering Corp., Kestral Corp., Plastictronics, Inc., and United States Fiber & Plastic Corp. A renewed trend toward the better protection of football and other contact-sports players was evident in the show, as exemplified by the use of foam and sponge rubber padding for football helmets, basketball knee guards, and other protective equipment.

Rubber and Plastics at the Notions Show

Foam rubber, rubber covered thread, vinyl plastic, and other plastic products were prominent in various exhibits of the twelfth National Notion & Novelty Show held at the Hotel New Yorker, New York, N. Y., February 9 to 13. Among the items on display were: shower curtains, rainwear, girdles, foundation garments, etc., sanitary goods, closet accessories, food bags and bowl covers, drape sets, aprons, garters, suspenders, elastic, bathing caps, shoulder pads, table cloths and table cloth covers, household plastic novelty items, combs, cushions and pillow protectors, utility capes, infants' bibs, panties, and aprons, crib sheets, bottle guards, crib and playpen pads, dress shields, hospital sheeting, beach bags, toys, and Lastex sewing thread.

Suppliers of some of the raw materials used in the manufacture of displayed articles included: The B. F. Goodrich Co., Union Carbide & Carbon Co., Goodyear Tire & Rubber Co., E. I. du Pont de Nemours & Co., Inc., and Firestone Tire & Rubber Co. Several articles on exhibit were manufactured from such products as Koroseal, Krene, Pliofilm, Velón, and Foam-eze.

Among the 227 firms participating in the show were: Acushnet Process Co., Advance Mfg. Co., Alka Novelty Co., Aviatrix Hair Net Co., Beau-Bra Foundations, Inc., Beyerle Mfg. Co., Inc., Blossom Mfg. Co., Boland Mfg Co, Bolta Comb Co., Consolidated Commodities, Inc., Warren Featherbone Co., Freeman Mfg. Co., King Associates, Adolph Klar, Klear-Vu Products Co., Inc., I. B. Kleinert Rubber Co., Koppers Co., Lincoln Elastic Products, Mid-West Marko, Inc., National Carbon Co., Inc., Nosco Plastics, Perfect Fit Products Co., Plastron Inc., Plymouth Rubber Co., Poly-Tex, Inc., Protex Products Co., Richards, Boggs & Associates, Salem Products Corp., Seal-Sac, Inc., Seely Shoulder Pad Corp., A. L. Siegel Co., Inc., Strauss Bros. & Co., Sturm & Scheinberg, Inc., Swan Creations, Inc., Transparent Cover Co., Inc., David Traum Co., Inc., Venus Corp., and Veriplast, Inc.

Frank Andrews

Southern Alkali Corp., owned jointly by Pittsburgh Plate Glass Co. and American Cyanamid Corp., has announced that its large liquid chlorine and caustic soda producing plant at Lake Charles, La., will reach capacity production this month. Constructed by the government during the war to produce magnesium metal, the plant has undergone an extensive remodeling program during the past 20 months. Southern Alkali is operating the plant under a leasing arrangement with the War Assets Administration. Both chlorine and caustic soda find applications in the rubber industry in addition to uses in many other chemical fields.

South Asia Corp., crude rubber brokerage, has moved from 80 Broad St. to 11 Broadway, New York 4, N. Y.

S. W. Richardson Carbon Co., Fort Worth, Tex., according to Sid W. Richardson, has appointed Frank Andrews sales manager for the new organization that will operate the Odessa, Tex., carbon black plant recently purchased from War Assets Administration. Mr. Andrews was with Phillips Petroleum Co. for the past 19 years and resigned from the managership of the Phillips chemical products department to accept this new position. In 1940, Mr. Andrews organized the sales department for Hycar Chemical Co. and in 1943 started the marketing division for Phillips furnace black.

The Odessa carbon black plant now has an annual capacity of about 53,000,000 pounds, which will be increased in the next few months by the addition of a third unit to approximately 71,000,000 pounds. When entirely completed, the plant will not only be one of the largest channel black plants in the world, but also one of the most modern. In addition to this plant the Richardson firm is building a large natural gasoline plant in the Keystone Field near Kermit, Tex. When completed, this plant will have a daily average production of about 86,000 gallons of propane and butane and 120,000 gallons of natural gasoline. The latter will eventually be separated into a wide range of close-cut solvents for use in the rubber, paint, and allied industries. The refinery at Texas City is now producing some of these products, and its facilities will also be enlarged to furnish the additional types that may be required. Additional manufacturing projects are being planned by the company and are well along in the development stage.

Breakfast with Kleinert

The trend in the notions market was the theme of a breakfast sponsored by I. B. Kleinert Rubber Co., Inc., 485 Fifth Ave., New York 17, N. Y., held the morning of February 10 at the Hotel Pennsylvania, New York. The affair attracted more than 650 notions buyers and merchandise managers from all over the country, gathered in New York to attend the National Notions Show that week. Presiding at the breakfast was Ralph K. Guinzburg, president of the rubber company, and speakers were Mrs. Helen Valentine, editor-in-chief of *Seventeen*, and A. W. Zelomek, a noted economist and head of International Statistical Bureau, Inc. Seated at the speakers' table also were the following Kleinert executives: Harry Kleinert, director; Roland and George K. Guinzburg and Paul McCampbell, vice presidents; Charles B. Mergentime, treasurer; Arthur Salinger, secretary; and Harold W. Quinby, sales manager.

President Guinzburg, in his introductory remarks, stated that the company has abandoned its policy of institutional advertising, necessitated by the late war, and has switched to item advertising in leading consumer magazines, with the greatest campaign undertaken by the company. According to the speaker, the "notions business is going to be good and continue to be good for a long time." A contributing factor to this business is the New Look in women's wear. The company estimates that "the American woman is going to spend 68 million dollars across the notions counters of America for protective and maintenance notions." Included in these items, of course, will be many of the Kleinert products, such as dress shields, garment grippers, baby pants, bibs, sheeting, sanitary goods, aprons, mats, proofed goods, playshoes, beach bags bathing caps and shoes and girdles.

Mrs. Valentine in her talk emphasized the importance of the teen-ager, who is vitally interested in fashions, homes, etc., as based on experience with her magazine, as an important factor in the demand for notions—now and in the years to come.

Mr. Zelomek, in considering economic trends affecting notions, stated that the recent decline in commodity prices was expected. He holds government buying partly responsible for price advances and insists that the cost of living must come down. From the present picture this economist anticipates only a temporary recession in business and sees no depression in the near future. Mr. Zelomek believes that after this temporary recession, "There should be several years of high level activity and steadily rising living standards. Major gains will be made for hard goods, and to some extent at the expense of textile-apparel items." The high level of activity, with its increased purchasing power for consumers, not to mention the increase in families, will see greater demand for automobiles, refrigerators, new homes, television sets, home furnishings, etc. All this, Mr. Zelomek, states, "is good for notions departments."

Sales Staff Changes

Realinement of Kleinert's sales staff, to weld it into the largest and most efficient selling group this company has had since prewar days, was effected recently. Division of the company into district groups, appointment of district sales managers, the addition of five new salesmen, the retirement of two veteran employes and the revision of sales territories to make for more concentrated coverage all over the nation are some of the changes involved.

Thomas J. Spearing, a salesman for the past 22 years, first in Chicago and then in the St. Louis territory, has been appointed district manager for the Midwest. He will continue to operate out of St. Louis.

Edward J. Kern, acting part time as district manager for the East, will now devote his full time to this effort. Headquarters for the eastern section will be maintained in Atlanta, Ga. The New England district and all other territory, including Metropolitan New York, will operate out of New York, N. Y., under the direction of Mr. Quinby.

In the rearrangement of territories into more concentrated areas New York State has been split into two sections. The western half will be covered by Herry Lansman, formerly operating in the Denver section. That territory now goes to Harry Mazur, who had been assisting Arthur Greenfield out of Minneapolis. Eastern half of New York State will be covered by Harry Epstain, who has long been on the sales floor in the New York showroom.

Robert Cramer, working in the Virginia and North Carolina section, has been reassigned to the Cleveland area, to succeed Bernie Lighter, resigned. Succeeding Mr. Cramer in the South is Philip Silver, a recent addition to the Kleinert sales staff.

Other new salesmen are Arthur Wagner, who will cover the Nebraska and Kansas accounts; Allen Forseter, to Missouri and Arkansas sections; and Stewart B. Parkinson, who replaces Mr. Kern with Florida accounts.

Louis Salomon, with 54 years' service at Kleinert, and Richard Cody, a 50-year service man, are both retiring from active selling.

St. Joseph Lead Co., 250 Park Ave., New York, N. Y., a leading producer of lead, zinc, and zinc oxide, has made Harry E. Outcault manager, zinc oxide sales. Mr. Outcault has been with the company since 1931, when its new Electro-Thermic zinc oxide plant, went into production. He served as manager of technical service and more recently as assistant sales manager. Prior to that time he had been associated with the New Jersey Zinc Co.—five years in the research division at Palmerton, Pa., and four years in technical service in the sales department in New York. Mr. Outcault was graduated from Ohio State University in 1917 with the degree of B. Ch.E. and associated himself early in his professional career with professional societies and is actively engaged in their work. He is a member of the American Chemical Society, American Institute of Chemical Engineers, American Ceramic Society, American Society for Testing Materials, National Paint, Varnish & Lacquer Association, Commercial Development Association, and Chemical Market Research Association. At present he is chairman of the Division of Rubber Chemistry, A. C. S.

Blanks Stoller

H. E. Outcault

C. J. Osborn, Co., manufacturer of synthetic resins and dispersed pigments, 132 Nassau St., New York, N. Y., according to Secretary W. F. Purdy, on January 31 welcomed members of the paint and allied industries to the opening of the new laboratory building adjacent to the company's plant on W. Blancke St., Linden, N. J. The new building will house technical executive offices, library, chemical laboratories, and laboratories for product development, application research, technical service, and physical testing. All the technical personnel of the company will henceforth occupy the new quarters. Research on resins and pigment dispersions will be conducted with expanded facilities for service to the surface coatings, ink, rubber, and related industries.

M. E. Davis has joined National Kaolin Products Co. as general manager supervising sales and production activities, with headquarters in Washington, D. C. Mr. Davis was formerly sales and technical service manager of the Trenton, N. J., office of Harwick Standard Chemical Co., Akron, O. National Kaolin, whose mines and plants are located at Aiken, S. C., manufactures and refines all types of clays, including Champion, the rubber clay sold through Harwick Standard.

National Sportsmen's Show

The eleventh annual National Sportsmen's Show was held in Grand Central Palace, New York, N. Y., February 14 to 23. Again occupying four floors of the Palace, the show offered a record number of more than 190 separate exhibits both by companies and by different states, Canada, and Mexico. The entire range of sporting equipment was shown, from rods, reels, lures, lines, and other fishing paraphernalia, through guns, clothing, and camping equipment for the hunter, to canoes, boats, motorboats, cruisers, motorcycles, and even automobiles. In addition to standard displays of equipment, the show also featured daily exhibits of bait and fly casting, surf angling, log rolling, canoe tilting, knife throwing, archery, trained dogs and seals, bird calling, and other features and sport contests.

Although rubber items were prominently displayed in the exhibits of many companies, only three rubber companies had individual exhibits at the show. The United States Rubber Co. displayed inflatable rubber sports boat and rubber boots for fishermen. Hodgman Rubber Co. showed a wide variety of rubber and rubberized clothing for the sportsman, while inflatable rubberized mattresses and a collapsible boat were exhibited by New York Rubber Corp.

Standard Oil Co. of New Jersey, 15 W. 51st St., New York 20, N. Y., has changed its name to Esso Standard Oil Co. in order to give formal recognition to the close association which has developed in the public's mind over a period of years between the corporate name of the company and its Esso trademark.

"The trademark Esso—first used in 1925 as the brand name for our premium motor fuel—has been given to more and more of the company's products until today it is the name under which our products are sold for use in cars, homes, farms, factories, ships, airplanes, and many other uses," said President M. J. Rathbone. "It's acceptance by the public has been so great," Mr. Rathbone added, "that Esso has been practically synonymous with the corporate name of the company."

Besides the use of Esso as a brand name, Mr. Rathbone pointed out, the oval Esso sign is displayed as their principal identification by approximately 25,000 independent gasoline dealers who sell the company's products in 18 states from Maine to Louisiana and the District of Columbia. The word Esso also is used in several other company activities which link Esso and the company name together in the public consciousness.

H. A. Astlett & Co., crude rubber importer and dealer, 27 William St., New York 5, N. Y., has reopened its Akron, O., office under the management of Moss-Mayfield, Inc., 309 Second National Bldg., Akron 8. A. D. Moss is president of the Akron concern, and F. A. Mayfield, vice president.

Astlett added to its staff H. B. Urtel, formerly assistant to the executive vice president of Hewitt-Robins, Inc., Buffalo, N. Y. Mr. Urtel will be responsible for the sales and distribution of liquid latex for H. A. Astlett & Co. and will be general manager of the Astlett Latex Corp's., bulking plant at Baltimore, Md.

In a recent announcement the Astlett company disclosed its entry into the liquid latex field and its association with Malayan interests in the production of creamed latex. The company expects initial shipments to arrive at its new Baltimore bulking plant early in May. Full provisions have been completed for tank car and drum shipments from that date.

Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J., has appointed R. F. Teeling manager of the local sales branch formerly known as "New Jersey Sales," but which now will function as "North Jersey Branch," to signify better the area of activity of the unit. Mr. Teeling, with the company 36 years, was assistant manager under Grannell E. Knox, manager of the branch for 34 years until his death in January.

P. W. Martin Gordon Clays, Inc., 33 Rector St., New York 6, N. Y., has changed its name to Southern Clays, Inc. P. W. Martin Gordon Clays, Inc., was for many years the producing unit for the domestic clay business of Moore & Munger, developing and supplying clay for the rubber industry. Then its policy of direct sales to the customer went into effect last August 1, and the company decided to adopt a corporate name more descriptive of its products. Its plant personnel in Georgia has not been changed; W. H. Shields continues as sales manager, with E. W. Schwartz in the rubber industry.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced that because of expanding business in the New York area and to give quicker and better service, the rubber chemicals division of its organic chemicals department has opened a New York, N. Y., office at 40 Worth St. Invoicing of orders and other services will be handled from this office for New York State, Connecticut, and northern New Jersey. Shipments will continue to be made from Deepwater Point, N. J. The New York office will be the headquarters of P. P. Murawski, J. P. Fuller, and H. W. Day. S. M. Conn is manager of the organic chemicals department office at the New York address.

Socony-Vacuum Oil Co. Inc., 26 Broadway, New York 4, N. Y., has announced a new low-pressure auto tire, the Mobil Air Cushion. Following the trend to lower pressures in tires, the new tire runs cooler than conventional tires, gives easier car handling, and provides better and safer steering. A limited number of the Mobil Air Cushion tires has been produced, and the company says that all popular sizes of the tire will be made available to Mobilgas dealers within a short time.

United States Rubber Co., Rockefeller Center, New York 20, N. Y., in its recent annual report to shareholders, showing an all-time high in sales ($580,968,091), stated that practically all established lines of products reached new high levels last year. A substantial volume of production, not reflected in sales to customers, however, but consumed within the company, was accounted for by the company's rubber plantations, textile mills, shoe hardware factory, and chemical and reclaim plants. The value of this production totaled $90,351,551. In addition the company produced during 1947, 196,000,000 pounds of various synthetic rubbers, valued at $31,000,000, in four plants owned by the government, but operated by U. S. Rubber.

The company's natural rubber plantations in Malaya, recovered early in 1946, were in full operation in 1947. A survey party was sent to investigate a part of the company's properties in Sumatra although the political situation there does not yet permit a complete survey. The company further feels that many serious problems must be studied before a final decision can be reached as to the advisability of resuming operations in Sumatra.

U. S. Rubber, which has started the current year with a continued high volume of business, at present anticipates that the total production and sale of rubber products in 1948, other than tires, may well exceed that of 1947.

Morningstar, Nicol, Inc., 630 W. 51st St., New York, N. Y., has consolidated its industrial adhesive manufacturing subsidiaries, Paisley Products, Inc., of Illinois, and Paisley Products, Inc., of New York. Murray Stempel, formerly general manager of the Chicago company, has been elected vice president and general manager of the consolidated operations; while Earl C. Lenz, formerly sales and service manager of the Chicago plant, has been promoted to general sales manager. He will also continue to direct the advertising and sales promotional activities of the consolidated operations. L. J. LaBrie, formerly technical director, has become sales manager of the New York plant.

Koppers Co., Inc., Pittsburgh 19, Pa., has announced a new adjustable troughing idler said materially to increase the life of conveyer belts. Invented by P. J. Conners, of the company's engineering and construction division, the idler has outer inclined pulleys adjustable from slightly above the horizontal up to an angle of 25 degrees. With this new design it is possible practically to tailor-make the idler installation to fit the conveyer belt. Ideally suited for use at locations on conveyers where any inclined belt changes to a horizontal path, the new idlers can be used in series to form the curve and provide the shallowest depth of trough necessary to retain the material without spillage. This shallow trough also eliminates excessive belt stretch at the edges and increases the belt's service life.

Koppers, in its recent annual report to stockholders, revealed that this year it expects greatly to increase output of polystyrene with a new plant at Kobuta, Pa.

A retirement benefit plan applicable to all hourly paid employes who reach age 65 and have been with the company 15 years or more was announced February 18 by Koppers Co., Inc. Employes attaining the age and length of service requirements become eligible at any time thereafter when they are unable to carry on satisfactorily because of age or disability. Payments will be made on a monthly basis. All costs of the plan, which is integrated with Social Security benefits of employers, will be paid by the company. At present there are approximately 10,500 hourly paid employes in the 53 plant locations of the company.

Thiokol Corp., Trenton, N. J., has been awarded a contract by the United States Army Ordnance for research and development work on fuels used for jet propulsion, particularly JATO (Jet Assisted Take Off) units. According to J. W. Crosby, Thiokol president, work has started at a site near Elkton, Md.

Pittsburgh Plate Glass Co., Columbia Chemical Division, Pittsburgh, Pa., recently announced several personnel changes. Robert M. Simpson has been appointed district sales manager with headquarters in Chicago, Ill. A native of Little Falls, N. Y., Mr. Simpson is a graduate of Cornell University with the degree of A.B. in chemistry. He has been in Columbia Chemical's sales organization since 1944. Brooks M. Dyer has been named assistant district sales manager at St. Louis, Mo. A graduate of Boston University, Mr. Dyer has been with the division as a sales representative in the Philadelphia district during the past five years.

C. C. Thompson, credit manager for Columbia, will continue in that capacity and also assume the responsibility of office manager at the division's headquarters, Fifth and Bellefield, Pittsburgh.

Paul R. McHail, with the firm since 1946, has been appointed manager, order and service department, with headquarters in Pittsburgh.

Ralph F. Wolf recently resigned as technical director of Harwick Standard Chemical Co., Akron, to join Columbia Chemical. He will work in its Barberton, O., laboratories on the development and application of rubber pigments and resin plasticizers. Among his former business affiliations are The B. F. Goodrich Co., Standard Oil Development Co., and Polson Rubber Co., and during the war he served on the OPM and WPB.

MIDWEST

Monsanto Announcements

Monsanto Chemical Co., St. Louis, Mo., on February 6 offered, through Smith Barney & Co., at $101 a share, 250,000 shares of cumulative preference stock, Series B, no par value, to pay a $4 dividend and convertible into common stock prior to March 1, 1958. Proceeds of the stock sale will be used to repay outstanding bank loans and for general corporate purposes.

The formation of a senior technologists group in the process section of Monsanto's general engineering department was announced February 10 by F. G. Gronemeyer, director of general engineering. The new group, established to provide specialized technical aid to all divisions and departments of the company, will be directed by J. M. Graham, Jr. In making the announcement, Mr. Gronemeyer explained that chemical technology had grown so rapidly recently that some branches had become essentially separate sciences.

"As knowledge increases," he said, "the individual finds it increasingly difficult to maintain proficiency in all branches of technology. Consequently there is a professional trend toward general practice on one hand and specialization on the other."

Four men were named to the group. They were selected on their specialization and broad experience in specific branches of technology. They will be assisted when necessary by the engineers of the process section, all of whom have a versatile background of general practice. Those comprising the group are Hart U. Fisher, instrument technologist; Alban J. Lobdell and Robert York, Jr., chemical engineering technologists; and Frank LeRoy Whitney, Jr., corrosion technologist.

Milton J. Scott last month was named assistant director of research of the Merrimac Division, Everett, Mass. A research chemist or group leader at Monsanto's plastics division in Springfield, Mass., since 1942, Mr. Scott will direct and supervise textile research and application at Merrimac headquarters. Besides, he will have charge of coordinating research with textile sales development as well as with other production groups. A native of Detroit, Mich., Mr. Scott has a B.S. degree in chemical engineering from the University of Michigan. He joined Monsanto after serving with Chrysler Corp. and American Cyanamid Co. He is a member of the American Chemical Society and the University of Michigan Club. Mr. Scott specialized in textile resins, surface coating, moldings and laminations at the plastics division headquarters. The results of his work are covered by several U. S. patents.

Allan W. Low has been made general superintendent of a new formaldehyde plant at Springfield, Mass. He had been employed by the General Chemical Division of Allied Chemical & Dye Corp. in manufacturing research and administrative capacities for the past 12 years. He was graduated from the University of New Hampshire in 1936 with a B.S. degree in chemical engineering and then joined General Chemical.

Monsanto has also announced that Gertrude Bailey has been added to the staff of its department of industrial and public relations. She will be the department's New York, N. Y., representative with headquarters at 445 Park Ave.

Oakleaf Promoted

Phillips Petroleum Co., Bartlesville, Okla., has announced that A. W. Oakleaf, manager of the Philblack district sales office at Akron, O., has been made general manager of Philblack sales in the United States and Canada. In his new capacity, Mr. Oakleaf will supervise domestic and Canadian sales of Philblack A, Phillips' high modulus furnace black, and Philblack O, Phillips' new high abrasion furnace black. Both carbon blacks are produced at Borger, Tex., by Philtex Chemical Co., a Phillips subsidiary. Sales of these blacks are handled through the Akron office and district offices at Chicago, Providence, and Trenton, and through agents in California and Canada. The company has a completely equipped technical sales service laboratory in Akron.

Mr. Oakleaf is a graduate of the University of Kansas with an A.B. degree in chemistry. After graduating in 1926, he worked for The B. F. Goodrich Co. and subsequently worked for United States Rubber Co., Toledo Industrial Rubber Co., and Continental Carbon Co., before joining Phillips Petroleum in March, 1944. He is a member of the Akron, Chicago, Detroit, and New York Rubber Groups, and the Akron City Club.

A. W. Oakleaf

Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill., has moved its Pittsburgh, Pa., district sales office to 5020 Centre Ave. This move is the first step in a program designed to expand the company's facilities in western Pennsylanvia. Plans are now being developed for new office and factory-branch store buildings to be erected on the site, to replace the present structure, which will, however, meanwhile provide larger quarters than available previously. The Pittsbugh office is headed by Otto W. Werner, district sales manager.

Frank C. Thompson, purchasing agent for Link-Belt Indianapolis plants since 1919, has retired in accordance with the company's retirement plan. He had entered the employ of the company's Pershing Road plant, Chicago, in 1906, and successively had charge of stores material at both this plant and Indianapolis, prior to becoming purchasing agent.

Richard J. Joyce has been made purchasing agent for Indianapolis plants, with headquarters at the Ewart plant, Indianapolis, to succeed Mr. Thompson. Mr. Joyce began working for Link-Belt in the foundry office at Indianapolis in 1917, was employed in the purchasing department, in sales, stores, and material handling from 1919 to May, 1947, and had been assistant purchasing agent since that time.

C. K. Williams Reorganizes

To serve the trade more effectively C. K. Williams & Co. and eight of its subsidiaries will be consolidated, effective March 1. The constituent companies, under the new corporate name of C. K. Williams & Co., are Geo. S. Mepham Corp., and Point Milling & Mfg. Co., both of East St. Louis, Ill.; Blue Ridge Oxide Co., Lehigh Gap, Pa.; Calcium Chemical Corp., Adams, Mass.; Seminole Pigment Co., Warren, O.; The Sulphiro Co., Inc., Martins Ferry, O.; Synthetic Iron Color Co., Richmond, Calif.; C. K. Williams & Co. of California, Ltd., Emeryville, Calif., and C. K. Williams Co., Easton, Pa. Executive offices will be at the East St. Louis, Ill., plant. Offices will remain at the several plant locations (Easton, East St. Louis, Emeryville, and Warren.) Additional sales offices are located in Atlanta, Chicago, Detroit, Montreal, Boston, Cincinnati, Los Angeles, New Orleans, Toronto, Brooklyn, Cleveland, Milwaukee, and St. Paul.

Officers of the new corporation are men who have been associated with these companies for periods ranging from 19 to 35 years. They are M. R. Williams, chairman of the board and treasurer; L. K. Ayers, president; J. W. Ayers, R. W. Dodson, Verne Frazee, J. W. Schlosser, and T. K. Stinson, vice presidents; and E. G. Davies, secretary.

Sales personnel will remain unchanged and will continue to be directed by present division managers, as follows; John Sellon, Easton; W. D. Nichols, East St. Louis; John S. Googins, Emeryville. The coordinating of sales to concerns operating nationally will be covered by W. N. Crumpler.

C. K. Williams & Co. was organized in 1878 by C. K. Williams and his father, Joseph T. Williams. The firm engaged only in the production of powdered soapstone during the early years of its existence. The first venture in the production of pigments was confined to the grinding of a few iron ores, which occured in small deposits around Easton. The business was expanded gradually by the purchase of ore-bearing properties in Pennsylvania, New Jersey, and more distant points, also by importing ochres from France, siennas from Italy, red iron ore from Persia and Spain, and umber from Cyprus.

Early in the 1900's the production of synthetic oxides was undertaken. Competition from England was keen, but C. K. Williams & Co. established a research program and with improved products was able to expand its markets beyond sales to the paints industry—its principal outlet. Its pigment were then successfully introduced to manufacturers of building products, glass, ceramics, leather finishes, linoleum, mastic floor tile, paper, polishing rouge, rubber, wallpaper, and of a number of specialties in the chemical and electronic fields.

About 1917 as greater demands for oxides materialized, the company instituted an expansion program. Through the purchase of existing businesses and establishment of new ones it acquired the eight companies which heretofore operated as separate units and are now being consolidated into one organization.

OHIO

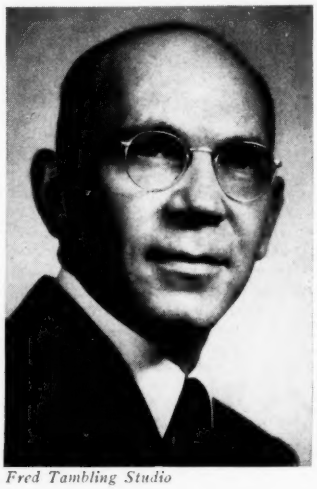
Weckesser Joins Polson

Ernie P. Weckesser has been appointed general sales manager of the Polson Rubber Co., Garrettsville, according to Vice President W. J. Frisby. J. W. McConnell, who handled sales for many years prior to Mr. Weckesser's appointment, continues as a director and secretary of the company.

Mr. Weckesser comes to his new post after more than 30 years in the rubber industry, most of that time in the sales field. Starting with the Miller Rubber Co. in 1916, Mr. Weckesser's service was interrupted by military life during World War I. Back with the company, he held executive posts in its service and sales departments, was chairman of the service manager's committee of The Rubber Manufacturers Association, and was manager of Miller automobile tire sales when that company was absorbed by The B. F. Goodrich Co. in 1936. Joining its associated tire lines division in 1930, Mr. Weckesser was assistant to the general manager of the division in 1932-33; assistant to the manager of automobile tire sales for Goodrich, 1934-35; manager of the Newark district of Goodrich tire sales, 1936-39; manager of the Detroit district, 1939-43. During the war he was transferred to Akron headquarters to handle problems created by the war man-power program and later was named administrator of all activities connected with the employment of returning veterans. When this program was completed, Mr. Weckesser returned to sales, joining the associated lines division as a division representative and more recently being manager of all product development and farm service tire sales after the division entered this field.

The Polson Rubber Co. was established in 1909 by H. B. Polson, who has been president of the company ever since, and has specialized in inner tubes since that time.

The Mohawk Rubber Co., Akron, through Ray E. Bloch, president and general manager, announced recently that Charles E. Sauvain has been appointed treasurer of the company, succeeding Mr. Bloch, who had been both president and treasurer. Mr. Sauvain, with Mohawk for 32 years, is a director in the organization and had previously been assistant treasurer. At the same time Nile E. Ries was named factory manager, succeeding John A. Christie, a director of the company who will devote his time to research and development. Mr. Ries has been with Mohawk since 1924 and prior to his promotion had been factory superintendent.



Fred Tambling Studio

Nile E. Ries

Promotions at General Tire

Six rubber chemists at The General Tire & Rubber Co., Akron, were assigned new positions as the company expanded and correlated its research facilities, it was announced last month by G. H. Swart, director of research. G. H. Stempel, Jr., former associate professor of organic chemistry at Carnegie Institute of Technology, has been made assistant director of research, while J. E. Ablard is now director of synthetic rubber research and development. Others appointed are: G. S. Schaffel, director of plastics research and development, H. L. Wunderly, director of analytical research; H. T. Roy, director of all activities of the Aerojet Division, Azusa, Calif., in the Akron laboratories; and Kermit Weinstock, acting head of physical testing and compounding research.

G. H. Stempel, Jr.

Dr. Stempel taught at Carnegie Tech for 17 years before coming to General in June, 1946. He earned his bachelor's, master's, and doctor's degrees at the University of Indiana. He is a member of the American Chemical Society and Sigma Xi.

Dr. Ablard, chief physical chemist at General before his latest appointment, also taught at Carnegie Tech. After his doctorate was conferred upon him there in 1937, he served as an instructor for one year.

Dr. Schaffel came to General with Dr. Stempel in June, 1946. He had been employed in the plastics division of Westinghouse research laboratories after obtaining his doctorate in 1941. Dr. Schaffel had been a student of Dr. Stempel and the latter recommended his pupil for his original position at General Tire.

Dr. Wunderly taught at Notre Dame, where he had received his doctorate in 1937. He joined General in September, 1946, after having served as director of the clinical laboratory at the Children's Hospital division of Mellon Institute.

J. E. Ablard

Dr. Roy starred as a basketball player at John Carroll University during his undergraduate days and after receiving his doctor's degree at Western Reserve University, returned to Carroll as an instructor from 1935-38. Prior to entering the employ of General in September, 1947, Dr. Roy had been in charge of the chemical division of Johnston & Jennings Co. seven years.

Mr. Weinstock served in the Army's Chemical Warfare Service during the war and joined General upon getting a medical discharge in 1943.

American Hard Rubber Co., Akron, last month completed three organizational changes, affecting H. D. King, Robert S. Wade, and Walter M. Smith. Mr. King, chief industrial engineer of the Akron plant, has been transferred to the New York, N. Y., office, 11 Mercer St., to fill the newly created post of product development engineer. Mr. King, with the Akron plant 22 years, held a number of positions in the engineering department. Mr. Wade, an employe of the company for the last decade, has been made supervisor of product engineering at the Akron plant. Mr. Smith, with American Hard Rubber 29 years, has been advanced to supervisor of manufacturing at the Akron plant; he formerly had been supervisor in the compound and milling division at Akron.

Oak Rubber Co., Ravenna, O., has announced a permanent display of its balloons and Squeeze-Me toys in Room 228, 200 Fifth Ave., New York, N. Y. R. L. Roberts, eastern representative, is in charge.

The Industrial Rayon Corp., Cleveland, announced on February 9 that Herman A. Bruson has joined the company as head of the high polymer research division, with headquarters at the company's main research laboratories in Cleveland. Dr. Bruson is noted for his work in the development of Plexiglas as well as other outstanding research accomplishments in the field of plastics and related materials. He is a graduate of Massachusetts Institute of Technology and received his doctorate at the Federal Polytechnic Institute, Zurich, Switzerland.

B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, will construct a new $3,000,000 general chemical plant at Avon Lake, O., on the land owned by the company there, where its chemical experimental station is already situated. Various general chemical products now in the development or semi-commercial stage will be produced. Construction is scheduled to begin this spring or early summer. Goodrich Chemical now operates plants in Louisville, Ky., Niagara Falls, N. Y., Akron, O., and a government owned rubber plant in Port Neches, Tex. The chemical products to be made in the new plant will supplement the company's present polyvinyl chloride resin, American rubber, and organic chemical products.

Seiberling Rubber Co., Akron, has reintroduced its "sealed-air" puncture-sealing inner tube for automobiles and trucks, after an absence from the market of more than six years. The tube, which utilizes a layer of soft, plastic gum held in place by strong rubber bulkheads to seal punctures, has been redesigned to eliminate excess weight, according to L. M. Seiberling, sales manager. To repair a puncture, the driver need only remove the nail, and the tube repairs itself as the soft gum flows into the injury. The company holds patents on the rubber bulkheads that retain the sealing gum in place inside the tube, preventing the gum from moving out of place and making the sealing action less effective and throwing the tire out of balance. The company's independent dealers have all received stocks of the new tubes.

T. M. Hughes, manager of accessories and repair materials sales for Seiberling, has been made assistant to Oscar Helfer, director of sales operations; while Orrin K. Feikert, formerly a truck tire engineer in the New York district, replaces Mr. Hughes in accessories and repair materials sales. Mr. Hughes, a 26-year employe of Seiberling, has had experience in most of the company's sales departments. Mr. Feikert joined the company in 1927 and served in both production and sales departments before leaving in 1937 to become service manager of Norwalk Tire & Rubber Co., Norwalk, Conn. He returned to Seiberling in 1945.

Harwick Standard Chemical Co., Akron, has appointed Harvey G. Greer technical director. Mr. Greer will be in the company's Akron office and will serve in both a sales and advisory capacity on product development and compounding problems for accounts. Mr. Greer worked on compound development for Goodyear Tire & Rubber Co., prior to the war, was secretary of Rubber Reserve's compounders committee during the war, and was subsequently development manager for Continental Carbon Co. As technical director for Harwick Standard, Mr. Greer brings extensive experience in the development of rubber and plastic compounds and will further expand the cooperative service of working out applications of the company's products to meet a growing diversity of manufacturing needs.

Also announced last month by President C. J. Harwick, was the appointment of George E. Griffin to the sales staff of the Akron general offices. Associated with The B. F. Goodrich Co. as compounder in its industrial products division for more than 20 years, Mr. Griffin, during the past year was development manager of the shoe

Harvey G. Greer

George E. Griffin

products division at Goodrich's Clarkville, Tenn., plant. During the war Mr. Griffin served on the WPB Consulting Technical Committee on soles and heels and industrial products. His vast experience in rubber compound development broadens the scope of Harwick Standard's technical service in the sales development of its extensive chemical line. Mr. Griffin is a graduate of Akron University, and also of the Cleveland Law School. He is a member of the American Chemical Society, and its Division of Rubber Chemistry and the Akron Section and the Ohio State Bar.

Changes at Goodrich

Several changes in the executive organization of the industrial products sales division of The B. F. Goodrich Co., Akron, have been announced by E. F. Tomlinson, division general manager. Orno B. Roberts, manager of the division's Chicago, Ill., district for the last 14 years, who retired because of health, has been succeeded by John S. Gulledge, manager of the Cincinnati district for the last year; his successor is Ernest E. Haupt. George W. Green has been named manager of manufacturers' sales of industrial products in the Chicago district. Robert T. Kain, manager of the industrial products district office in San Francisco, Calif., for the last two years, has been transferred to Dallas, Tex., as manager of that district succeeding David R. Anderson, now on special sales duties. Harland B. Lane has been assigned the San Francisco district managership.

Mr. Roberts had been with the company 35 years, with a quarter-century in industrial products sales. He is an alumnus of the University of Chicago. Mr. Gulledge, a graduate in electrical engineering from Kansas State A & M, joined Goodrich in 1928, was an industrial products salesman 11 years, and advanced to district manager at St. Louis in 1939. Recalled to service with the Army Air Forces in 1942, he ended the war as a colonel.

Mr. Haupt has been with the company since 1914, in industrial products sales for the last 30 years and as salesman in Cleveland for eight years before his latest promotion. Mr. Kain, a graduate of the United States Naval Academy, came to the company in 1927 and became an industrial products sales engineer several years later. Returning to the navy in 1942, he ended the war as a lieutenant commander, going to the Coast post on his return. Mr. Lane, a graduate of Stanford University, also has been with the organization 20 years, all in industrial products sales in the San Francisco district.

Joseph C. Herbert, until January manager of Goodrich's newest tire and tube manufacturing plant in Tuscaloosa, Ala., has been named assistant managing director of Industria Colombiana de Llantas, Bogota, Colombia, a Goodrich associated company, according to W. C. Gulick, president, International B. F. Goodrich Co. Mr. Herbert, a native of Cleveland and a graduate of the law school of Western Reserve University, joined the Goodrich legal department in 1927. The following year he was named secretary of Pacific B. F. Goodrich in Los Angeles, but returned to Akron in 1931 as assistant counsel of the company. In 1934 he became general manager of the company's California plant, serving there until 1941 when he was made assistant secretary and later general manager of Lone Star Ordnance, Texarkana, Tex., world's largest bomb and shell loading plant built and operated by Goodrich for the government. He became plant manager at Tuscaloosa in 1946.

On February 10, Goodrich held the first of a series of 10 sales meetings in strategic trading areas promoting the company's tubeless tire. At the meeting of Goodrich territory and state managers in the New York area at the Hotel New Yorker, and at a subsequent press conference, Guy Gundaker, general manager of tire sales, said that the tubeless tire met with enthusiastic response from the trade in the Cincinnati district where it was placed on public sale early in January. As presently determined for the Cincinnati area, Mr. Gundaker said, the price of the tubeless tire in the 6.00-16 size would be about 24% higher than the price of a regular tire and tube, and about 16% less than the price of a regular tire and a Seal-O-Matic tube.

B. F. Goodrich is now offering tires for sale in Belgium, Luxembourg, and Holland, made at its new associated factory, N. V. Nederlandsch-Amerikaansche Autobandenfabriek, "Vredestein," Burgemeester Stroinkstraat, Enschede, Holland.

Goodrich President John L. Collyer recently was reelected chairman of the Business Advisory Council for the United States Department of Commerce.

The Timken Roller Bearing Co., Canton, has announced the retirement of William A. Fowler, general manager of the Columbus plant, who has been succeeded by L. D. Gable, factory manager of the plant for the past three years.

Mr. Fowler joined Timken on October 17, 1910, as a toolmaker and progressed through various positions in the tool department until 1919, when he was promoted to foreman. Three years later, Mr. Fowler was transferred to Columbus, where he became superintendent of the the Columbus division of the company and in 1929, general manager.

Mr. Gable began with Timken in 1912, worked in various departments, then was assigned to the chemical laboratory and then to the metallurgical laboratory. After service in World War I, Mr. Gable returned to Timken and within a few years was made head of the metallurgical department of the Canton bearing factory. In 1940, however, he became general superintendent of the factory, which position he held until his transfer to Columbus in 1945.

Pardee H. Frank, service manager of the Timken company, also retired February 1 after 27 years of continuous service. He has been replaced by Elmer Anderson, assistant service manager for the past year and a half.

Joining the firm in May, 1921, Mr. Frank was assigned to the physical laboratory and after eight months was placed in charge. After seven years he was promoted to the engineering department; next he was promoted to service engineer and for 17 years did extensive traveling throughout the United States, Canada, and England. Then he was advanced to the post of service manager in charge of industrial and automotive engineering, a position he held for the past three years.

Mr. Anderson began his career with Timken February 21, 1929, in the industrial engineering department. In August, 1931, he joined the service engineering department and in 1935 became a service engineer. He traveled the Midwest territory. After 13 years he was appointed assistant service manager at Canton in October, 1946.

Developments at Goodyear

The Goodyear Tire & Rubber Co., Akron, this year celebrates its fiftieth anniversary.

Dr. L. C. Hatch has been appointed medical director of The Goodyear Tire & Rubber Co. Dr. Hatch, who came to Akron in 1942 to direct the hospitals at Goodyear Aircraft plants, had been assistant medical director of the parent company's Akron plants since November, 1946. In his new position Dr. Hatch has direct charge of Akron hospitals and staff and will also be responsible for direction of medical policies for all Goodyear operations. He entered the Goodyear organization after serving 10 years as chief medical officer of the University of Pennsylvania hospital at Philadelphia.

Sherman G. Burgess has been appointed personnel manager of the company's molded goods plant at St. Marys, O., succeeding Randolph B. West, who returns to Akron as assistant to the director of personnel, F. J. Carter. Mr. Burgess joined Goodyear in 1931 at the Los Angeles plant after graduating from the University of Southern California. He transferred to Akron in 1940 as Plant 2 employment manager and subsequently became manager of personnel efficiency, labor division manager, and assistant to the director of personnel. A Georgia Tech graduate, Mr. West started with Goodyear in Akron in 1934. After two years as a mechanical goods designer, he transferred to personnel work in 1937. He was a time-study man at the Jackson, Mich., plant for two years before becoming personnel manager at St. Marys.

William C. Kirschner, who served as a captain in the Chemical Warfare branch of the Army during World War II, is a recent addition to the staff of the plastics and coatings department, chemical products division. Mr. Kirschner, a member of the American Chemical Society, a graduate of Lehigh University, and a native of Flushing, L. I., had been formerly employed by U. S. Stoneware Co. H. R. Thies, manager of the plastics and coatings department, said Mr. Kirschner will take a training course in Goodyear's expanding chemical products field and later will be assigned to a territory

With Airfoam operations scheduled for last month at Goodyear's Plant C and Pliofilm production slated for the spring, H. R. Child, manager of the special products manufacturing division, recently announced several key appointments at the plant: W. G. Bernel, manager of production control and merchandise distribution functions applicable to the new plant; C. R. Scott, master mechanic; S. A. Purnell, superintendent of service; W. P. Heydorn, superintendent of Pliofilm production; W. J. Lloyd, supervisor of factory costs; D. W. Doner, manager of personnel; and J. T. Richardson, superintendent of Airfoam production.

Karl J. Leary has been named Airfoam representative in the Chicago district, visiting furniture and mattress manufacturers. Mr. Leary, who joined Goodyear to assume this position, formerly was Cincinnati representative for a food manufacturer. He is a graduate of Ohio Wesleyan University.

Arthur E. Grundy, Pliofilm representative at San Francisco, Calif., has been named West Coast district manager. He will continue his headquarters at San Francisco. He joined Goodyear as a general line salesman in 1928, later served in San Francisco, Portland, Honolulu, and Philadelphia; was sales manager of the Goodyear Export Co. in New Zealand carried out a special assignment in Peru for the company, and was associated for several years before the war with the Pliofilm department. In 1943 he was shifted to fuel tank sales at Akron, later becoming manager of that department. After the war he returned to Pliofilm sales and was assigned to his post at San Francisco. He was winner of the Litchfield medal for domestic sales by the company in 1933. Mr. Grundy was born in Spokane, Wash., and attended the University of Southern California and Stanford University.

Goodyear Aircraft's Amphibian Ducks

Goodyear is manufacturing 200 nylon mattresses spread and impregnated with a specially compounded mixture of rubber for the Army's 1948 survival test operation in Alaska this winter. The mattresses are so compounded and constructed that they are expected to remain resilient at temperatures of —70° F. Construction of the mattresses is similar to the conventional air mattress, being compartmented to insure a flat pad when inflated. Weighing approximately two pounds each, the nylon mattresses measure 76 inches long and 27 inches wide.

The Slusser trophy of the best 1947 safety record among worldwide plants of the Goodyear company will be awarded the Torrance, Calif., synthetic rubber manufacturing plant, it was announced recently by J. T. Kidney, safety director. The plant's 307 employes worked 534,000 manhours during last year without a lost-time accident, for a perfect record. The trophy is given each year to the plant with the best safety record based on frequency of accidents times severity of injury.

Second-best record for the worldwide Goodyear organization was the synthetic rubber manufacturing plant at Houston, Tex. One accident in that plant accounted for five days' lost time during 1947. The 379 employes in this plant worked 765,000 man-hours in 1947.

Winner of the 1946 trophy placed third last year with five accidents and 245 lost time days. This plant, at St. Hyacinthe, P. Q., Canada, employs 790 workmen, who piled up an impressive two million manhours worked in 1947.

Records of the first three place winners for 1947 are better than those of the three plants which were the winners for the year 1946.

Nine GA-2 three-place amphibians have been placed with fixed base operators in the East, South, and Midwest by Goodyear Aircraft Corp. in its wide-scale field survey program. When completed, 15 of the 145-h.p. Ducks will included in the program which is designed to collect service data on the airplane and test pilots' reactions. Aviation organizations with which the planes are based are required to operate them equally on land and on water. Powered with a Franklin pusher engine mounted atop the wing, the Duck has a cruising speed of 110 m.p.h., a top speed of 125 m.p.h., and a landing speed of approximately 56 m.p.h. The prototype of the Duck was used for development work, and the plane is the first with retractable-type landing gear to be flown with cross-wind landing wheels. The field test program is under the direction of the company's saleseman-pilot, Art Chapman, and none of the planes has been released for sale. Each operator will keep the plane assigned him for 60 days. After then the ship will be returned to Akron for complete overhaul and then assigned to another flying organization for continuation of the testing.

Goodyear plans a one-story district office and warehouse building, 25,000 square feet in area, at Airport Way and Connecticut Ave., Seattle, Wash. The building, to be finished by early summer, will be on the Northern Pacific Railway and also will have adequate facilities for truck loading. W. P. McGlynn is district manager for the Goodyear Tire & Rubber Co. in Seattle.

NEW ENGLAND

Tri-Power Press Distributers

W. H. Ware, president of Hobbs Mfg. Co., Worcester, Mass., recently announced completion of the company's distributer set-up for the new Tri-Power die cutting press. Each distributer has been granted exclusive distribution rights on the new press in his respective territories. In the East, distribution will be handled by E. P. Lawson Co., New York, N. Y., whose territory includes New England, New York, Pennsylvania, New Jersey, Maryland, Delaware, Virginia, and West Virginia. Southeastern Printers Supply Co., Atlanta, Ga., is handling sales in North and South Carolina, Georgia, Florida, Tennessee, Alabama, and Mississippi, with the Southwestern Printers Supply Co., Dallas, Tex., covering Texas and Oklahoma (except Panhandle and West Texas), Arkansas, and Louisiana. In the Midwest the Tri-Power will be represented by N. C. Benson Co., Chicago, Ill., covering Ohio, Indiana, Illinois, Michigan, Kentucky, Missouri, Iowa, eastern Kansas and Nebraska, Wisconsin, and Minnesota. The Denver and Rocky Mountain area has been assigned to A. E. Heinsohn Co., Denver, Colo., whose territory includes Colorado, Wyoming, Utah, North and South Dakota, western Kansas and Nebraska, the Panhandle of Oklahoma and Texas, west Texas, eastern Arizona and New Mexico. Present plans call for direct handling of Pacific Coast sales by the company, although it is expected that a Pacific Coast distributer will be appointed later in the year.

Distributer representatives will cover all industries in which the new Tri-Power is readily adaptable, including rubber products, printing, envelope, paper products, wearing apparel, shirt, corset and underwear, and many others.

Cabot Carbon Co., Boston, Mass., has elected E. L. Green, Jr., executive assistant and head of the natural gas and gasoline department, vice president of the company. Mr. Green is a Texan who, since graduation from the University of Texas in 1929, has spent all of his professional career in the petroleum and gas fields of the Southwest. After three years with Gulf Oil Corp., he went with the Texas Railroad Commission and was supervisor successively of the Panhandle and Gulf Coast Districts. He joined the Cabot company in 1936.

E. L. Green, Jr.

Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass., has installed a universal model of the RCA electron microscope in its laboratories for increased service to the rubber, paint, ink, and other industries using the company's carbon black. Operated under the direction of C. A. Stokes, director of Cabot research and development, and Chief Chemist W. R. Smith, the microscope supplements other laboratory equipment for the study of surface areas and heats of adsorption of carbon blacks.

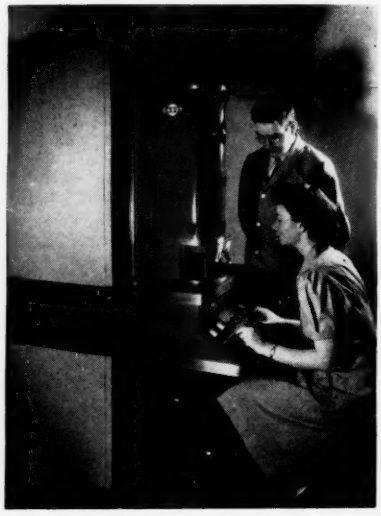
W. R. Smith, chief research chemist, gave a talk on the manufacture and applications of carbon black before the Appalachian Geological Society on February 9 in Charleston, W. Va. Dr. Smith pointed out that carbon black is one of the primary commodities in the chemical industry and discussed the various applications of carbon black, including its use in rubber, printing ink, paint, and plastics. Dr. Smith's talk was followed by a showing of the Cabot film, "Inside the Flame," which illustrates the manufacture of channel black.

Seven Grades of Silicone

General Electric Co., chemical department, Pittsfield, Mass., is marketing seven standard grades of G-E silicone rubber compounds to molders and fabricators. All stocks withstand temperatures ranging from —70 to 520° F. and have excellent electrical and chemical properties. Stocks available include both molding and extrusion compounds which may be readily processed in standard production equipment. Grades No. 1300 and 13001 are white extrusion stocks; Grade 13002 is a white molding stock; Grades No. 13003, 13005, and 13006 are brown stocks for both extrusion and molding; and Grade No. 13004 is a white stock for both extrusion and molding.

The company recommends that molding compounds be premilled for about 10 minutes on cold rolls prior to molding to insure satisfactory flow and plasticity. Molding should be performed at low pressures in standard compression or transfer molds, and the mold design should allow for about 2-3% dimensional shrinkage on curing. Flash-type molds give the most satisfactory results at pressures not exceeding 100 p.s.i., whereas positive or semi-positive molds are usually operated at 400-500 p.s.i. A molding temperature of 140-160° C. should be used for G-E silicone rubbers and should be maintained for 2-10 minutes, depending on the size and cross-section of the piece. Molds should be loaded and unloaded at temperatures below 50° C. to prevent blistering and porosity in the molded piece. Extruding of silicone rubber stocks is performed in either short or long barrelled production machines, but the latter is preferable, according to G-E. Accurate control of extrusion speed and die temperatures results in better surfaces and closer dimensions for the finished product. Die design should conform closely with the shape of the finished part.

General Electric recently announced a new silicone rubber adhesive which permits bonding of fully cured rubber to itself and to other surfaces.



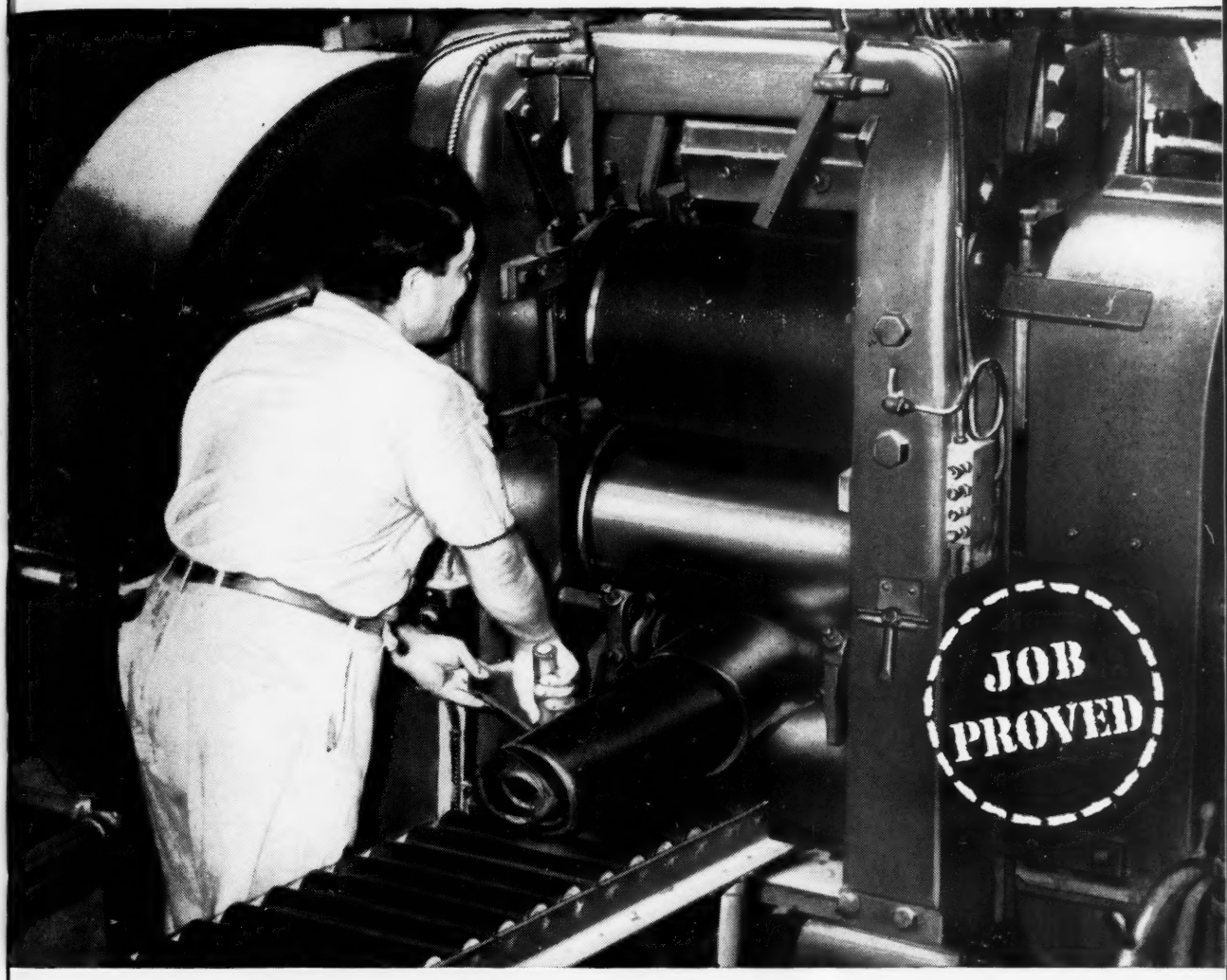
Cabot's New Electron Microscope Examined by Chief Chemist W. R. Smith and Technician Mary Martin

Arthur D. Little, Inc., 30 Memorial Dr., Cambridge 42, Mass., recently announced officers for 1948 as follows: president, Earl P. Stevenson; vice presidents, Raymond Stevens, Thorne L. Wheeler, and Leroy F. Marek; treasurer, Henry Powning; and secretary, Frank N. Houghton. Among the new directors elected is Everett Morss, president of Simplex Wire & Cable Co., Cambridge.

The National Sherardizing & Machine Co., 868 Windsor St., Hartford, Conn., has announced the addition of a new tilting feature as standard equipment on its airbag buffing machine. This feature is operated by a hand-wheel which can tilt the gear box that holds the airbag approximately 20 degrees in either direction. The tilting feature enables the operator to buff closer to the bead and the extreme outside diameter of the airbag. The company's No. 2 airbag buffing machine, complete with motors, V-belt drives, exhaust hoods, two-speed drive gear box, and tilting feature, has a net weight of 3,720 pounds and occupies a floor space of 3½ by 11 feet. The machine comes equipped with three individual aluminum airbag holding rings, and additional rings are available on order.

Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., according to President J. I. Simpson will ask its shareholders at the annual general meeting, March 11, to approve termination of the agreement in effect since 1932 between Dunlop and Canadian Industries, Ltd., under which the latter firm has been providing certain managerial services. G. W. Huggett, H. Greville Smith, and T. W. Smith, officials of Canadian Industries have expressed their willingness to continue as directors during the transitional period. Dunlop Rubber Co., Ltd., of England, recently acquired the minority stock holding in the Dunlop company formerly held by Canadian Industries.

Saving $2,000 a Year



SUNDEX RUBBER PROCESSING AID...

Gives Greater Strength and Wear-Resistance to GR-S Stocks for Heavy Footwear

A manufacturer of heavy rubber footwear recently tested samples of GR-S rubber made with Sundex 53, and samples made with three other products, including his regular processing aid. In every case the rubber that had been plasticized and softened with the Sun product had better tensile strength and gave better results in elongation and abrasion tests.

A saving of $2,000 a year was effected in this plant as a result of changing to Sundex 53 — a higher quality product that costs less.

Sundex 53 is clean, uniform and easy to handle. It can be used in making various colored rubbers (other than white) without causing discoloration.

For practically every type of rubber there is a Sun processing aid that will speed up manufacture and improve quality. They do not cause surface bloom even in exacting products like chemically-blown sponge rubber, white sidewall tires and pastel-colored articles. For full information about Sun's "Job Proved" rubber processing aids, write Department RW-3.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***
In Canada: Sun Oil Company, Ltd.—Toronto and Montreal

SUN
SUNOCO
INDUSTRIAL
PRODUCTS

Patents and Trade Marks

APPLICATION

United States

2,433,834. **Laminated Garment for a Body or Body Member Including Layers of Water-Impermeable Material.** H. C. Bazett, Haverford, Pa., and P. A. Siple, United States Army, Arlington, Va.

2,433,854-855. **Flexible Wheel Cover.** G. A. Lyon, Allenhurst, N. J.

2,433,937. **In a Plastic Extrusion Machine, Including a Die for Extruding a Plastic Mass in the Form of a Tube of Comparatively Small Peripheral Cross-Section, a Ring-Shaped Tube of Comparatively Large Cross-Section and of Stretchable Material Mounted near the Die and in the Path of the Tube Being Extruded.** H. T. Tornberg, Ridgewood, N. J., assignor to Modern Plastic Machinery Corp., Wilmington, Del.

2,434,183. **Oil Seal.** W. I. Tawes, Claymont, Del.

2,434,198. **Rubber Facial Heating Mask.** S. Duma, State Island, N. Y.

2,434,207. **Anti-Skid Tire Having a Rubber Tread in Which Coarse Saw Dust Is Uniformly Dispersed.** C. A. Gapen and L. Gapen, both of Morgantown, W. Va.

2,434,217. **Elastic Waist Band in Trousers.** A. J. Miller, York, assignor to Cohler Co., Inc., Red Lion, both in Pa.

2,434,258. **Clamping Connector Including a Tube of Flexible Material Adapted to Expand Circumferentially When Shortened and to Contract When Lengthened.** L. Frank, Fellows, Calif.

2,434,259. **In a Machine for Forming Sheet Metal, and Including a Stretching Block with Forming surface, a Stretching Sheet of Rubber Adapted to Flow When Subjected to Pressure between the Forming Surface of the Stretching Block and the Metal to Be Formed.** F. W. Wiesner and a Coulter, both of Baltimore, assignors to Glenn L. Martin Co., Middle River, both in Md.

2,434,462. **For Finishing Surfaces of Sprayed Fibrous Material, a Texturing Device Including a Tube Enclosed in a Cylindrical Roller of Resilient Material.** J. L. Kempthorne, Montclair, N. J.

2,434,501. **Decorative Fabric Having a Relief Design and Including a Fabric Material Vulcanized to a Layer of Latex Foam Rubber.** F. H. Untiedt, Chevy Chase, Md.

2,434,532. **Flexible Unwoven Fabric, Simulating a Fabric Made of Distinct Filaments, and Composed of Synthetic Organic Plastic Material.** H. Wurzburger, New York, N. Y., assignor to P. D. Wurzburger, Cleveland Heights, O.

2,434,533. **Single Filament of Synthetic Organic Plastic Material Simulating the Appearance of a Plural Stranded Rope.** H. Wurzburger, New York, N. Y., assignor to P. D. Wurzburger, Cleveland Heights, O.

2,434,565. **In a Wiping Device for Controlling the Amount and Distribution of Coatings Applied to Wire and Including a Housing in Which a Helical Member Is Arranged, an Elastomeric Packing Associated in Pressure Contact with the Helical Member to Promote Accurate Wiping of the Applied Coatings.** L. R. Hill, Wilkinsburg, and J. J. Keyes, Edgewood, assignors to Westinghouse Electric Corp., East Pittsburgh, all in Pa.

2,434,612. **Air-Vented Nursing Bottle and Nipple.** D. E. Hamiel, Columbus, O.

2,434,614. **For Cold Working Solid Optical Material, an Abrading Lap Having a Working Surface Consisting of a Thermoplastic Cellulose Derivative Molding Comoposition.** L. M. Hicks, assignor to Eastman Kodak Co., both of Rochester, Pa.

2,434,641. **Cushion Construction Including a Pair of Juxtaposed Resilient Sheets Secured together, Fluid Filled Resilient Bellows Integral with Each of the Sheets Positioned to Form Resilient, Communicating Chambers, and Means to Supply Fluid to the Interiors of the Chambers.** H. L. Burns, Yellow Springs, O.

2,434,666. **Thin Wall Housing for an Electromechanical Transducer, Non-Corrosive Liquid Having the Same Impedance Characteristics as Water.** W. P. Mason, West Orange, N. J., assignor to Bell Telephone Laboratories, Inc., New York, N. Y.

2,434,687. **Fluid Sealing Device Including a Washer-Like Ring of Rigid Material to Which Is Bonded an Annular Rubber Body.** H. Clayton-Wright, Stratford-on-Avon, England, assignor to S. C. Leonard, Detroit, Mich.

2,434,703. **Leakproof Dry Cell Including a Closure of Molded Insulating Material.** M. D. Koppelman, New Haven, Conn., assignor to Olin Industries, Inc., a corporation of Del.

2,434,743. **In a Skirt of Tubular Material, a Belt Assembly Including an Annular Elastic Band and Elastic Threads Stitched Circumferentially through the Belt Assembly.** M. H. Middendorf, Burbank, Calif.

2,434,761-762. **In a Combination Including Two Relatively Rotable and Coaxial Structures Adapted for Frictional, Torque-Sustaining Engagement with Each Other, a Fluid-Distensible Member for Effecting the Engagement and Having a Thick Distending Wall of Rubber-Like Material.** T. L. Fawick, Akron, O., assignor to Fawick Airflex Co., Inc., a corporation of Ind.

2,434,770. **Shoe Sole Having as Wear Receiving Element a Strip of Resilient Anti-Slip Material Wound in Open Helical Form.** W. J. Lutey, Seattle, Wash.

2,434,793. **Electric Cord Including a Flexible Insulating Sheath with Longitudinal Conduits Each Enclosing a Flexible Conductor; Each Conductor is Sealed to the Sheath at Each End of Its Conduit.** E. B. Feaster, Springfield, Mass.

2,434,803. **Freezing Mold for Refrigerators, Including a Resilient Top Tray and a Resilient Bottom Tray.** A. C. Johnson and C. C. Oliver, both of New Orleans, La.

2,434,817. **For Application to the Lower Portion of a Man's Suit Form to Increase its Length, an Extender Including Sections of Stiff but Flexible Sheet Material Connected by Elastic Strips.** G. Tanzer, Everett, Mass.

2,434,829. **Loom Temple Roll Including an Integral Body of Elastic Material.** E. B. Tifft, assignor to Draper Corp., both of Hopedale, Mass.

2,434,835. **Variable Fluid Passage.** R. S. Colley, Kent, O., assignor to B. F. Goodrich Co., New York, N. Y.

Dominion of Canada

445,696. **In a Hydraulic Cylinder Assembly Including a Sheet Metal Cylinder with Inwardly Facing Cavities at Both Ends, a Resilient Rubber Ring in Each Cavity to Form a Fluid-Tight Seal.** J. B. Parsons, Toledo, O., U. S. A.

445,741. **Rubber Valve Stem.** Dill Mfg. Co., Cleveland, assignee of J. C. Crowley, Cleveland Heights, both in O., U. S. A.

445,756. **Buoyant Insulated Electric Power Cable with a Flexible Core Including a Series of Cylinders of Soft Expanded Rubber or the Like with Intercalations of Cylinders of Relatively Rigid Material Like Hard Expanded Rubber, Cork, or Wood.** W. T. Henley's Telegraph Works Co., Ltd., Dorking, assignee of P. Dunsheath, St. Paul, both in Surrey, and W. C. Barry, Gravesend, Kent, both in England.

445,757. **Buoyant Electric Cables Including an Open Helix Enclosed in a Waterproof Covering and Divided along Its Length into Closed Compartments by Plugs of Rubber Expanded in Situ.** W. T. Hendey's Telegraph Works Co., Ltd., Dorking, Surrey, assignee of H. A. Tunstall and H. A. MacDonald, both of Gravesend, Kent, both in England.

445,800. **Ropes Made from Filaments of Regenerated Cellulose Impregnated with a Solution of a Water-Resistant Ethyl Cellulose in a Hydrophobe Liquid.** C. G. Bonard, London, administrator of the estate of H. Dreyfus, deceased, in his lifetime of London, assignee of D. Finlayson and R. G. Perry, both of Spondon, both in England.

445,827. **Punch Bag with Inflatable Bladder.** T. F. Williams, Tamaqua, Pa., U. S. A.

445,928. **As Packaging Material, Cast Rubber Hydrochloride Film.** Wingfoot Corp., Akron, assignee of H. J. Osterhof, Cuyahoga Falls, and LaV. E. Cheyney, Akron, both in O., U. S. A.

445,929. **Salvage Apparatus for Raising Submerged Objects from Water.** Wingfoot Corp., assignee of M. J. Sturtevant, both of Akron, O., U. S. A.

445,938. **Signal Device for Airplanes, Including a Container in Which Is Releasably Mounted a Lighter-Than-Air Balloon.** J. A. Allard, Hull, P. Q.

445,941. **For a Mechanical Part a Bearing Including Four or More Separate Stiff Bearing-Surface Elements Assembled Close Together and Embedded in a Supporting Body of Highly Resilient Rubber-Like Material.** F. E. Burger, near Reading, Berkshire, England.

445,956. **Gaseous Discharge Tube, Including a Sealed Envelope Protected by a Shell of Non-Frangible, Transparent, Substantially Resilient Material, and Shock Absorbing Cushions in the Base and Closed End of This Protecting Shell.** S. G. Klumb, Milwaukee, Wis., U. S. A.

446,040. **Inflatable Athletic Ball.** T. W. Smith, Jr., Akron, assignor to Sun Rubber Co., Barberton, both in O., U. S. A.

446,054. **Deicing Device for Aircraft Including a Plurality of Inflatable Tubes and System for Controlling the Operation of the Device.** M. L. Taylor, Hudson, O., W. B. Pond, West Englewood, and H. A. Eayrs, Tenafly, both in N. J., assignors to Bendix Aviation Corp., South Bend, Ind., all in the U. S. A.

446,067. **In a Brassiere, an Integral Structure of Molded Plastic Material.** I. F. Hill, Stratford, Conn., U. S. A.

446,072. **Plastic Tire Cover.** G. A. Lyon, Allenhurst, N. J., U. S. A.

446,130. **Endless Transmission Belt.** R. Y. Case, Torresdale, Pa., U. S. A., assignor to Dominion Rubber Co., Ltd., Montreal, P. Q.

446,197. **Submarine Signal Detector, Including a Fluid-Tight Rubber Container.** A. H. Inglis, Upper Montclair, N. J., assignor to Bell Telephone Laboratories, Inc., assignor to Western Electric Co., Inc., both of New York, N. Y., both in the U. S. A.

446,213. **Gas Mask for Horses.** O. Herbin, Le Fidelaire, Eure, France.

446,215. **In Apparatus for Molding Veneer, an Inflatable Member for Applying Pressure.** C. U. Gramelspacher, assignor to Jasper Wood Crafters Inc., both of Jasper, Ind., U. S. A.

446,244. **Flexible Composite Rope Including Individual Steel Strands and Strands of a Resilient Organic Polymer.** R. F. Warren, Jr., Stratford, Conn., U. S. A.

446,272. **Plastic Rivet Formed of a Mixture of Rubber and Thermoplastic Resin.** E. A. Eakins, Mishawaka, Ind., U. S. A., assignor to Dominion Rubber Co., Ltd., Montreal, P. Q.

United Kingdom

595,690. **Self-Sealing Oil Tanks.** B. F. Goodrich Co.

595,709. **Inflatable Suits.** H. G. C. Fairweather (B. F. Goodrich Co.).

595,728. **Pneumatic Spring Suspension of Vehicles.** A. Lees.

595,812. **Resilient Mounting Especially for Supporting Aircraft Engine Cowls.** Lord Mfg. Co.

595,830. **Friction Devices.** Firestone Tire & Rubber Co.

595,870. **Compound Sheet Material.** Imperial Chemical Industries, Ltd., J. H. McGill, and E. W. Lees.

595,876. **Windscreen Wipers.** Aircraft Hydraulic Appliances, Ltd., and H. N. Wylie.

595,883. **Erasers.** Huvit Ges.

596,020. **Flexible Rubber Couplings.** F. F. Allwood.

596,053. **Spring Wheels, Particularly Pneumatic Tired Wheels.** N. G. Riley.

596,289. **Power Transmission Belts.** Wingfoot Corp.

596,333. **Rubber Springs.** Firestone Tire & Rubber Co.

PROCESS

United States

2,433,911. **Producing a Hermetically Sealed Lead through Terminal by Forcing a Conductor Rod through an Assembled Rubber Sleeve and Metal Eyelet and Soldering the Eyelet to a Supporting Metal Wall Whereby the Rubber Is Vulcanized to the Eyelet.** L. Johnston, Park Ridge, Ill.

2,434,035. **Rubber Gloves and Similar Articles.** W. W. De Laney and C. J. Crowley, assignors to Seamless Rubber Co., all of New Haven, Conn.

2,434,111. **Elastic Fabrics.** T. G. Hawley, Jr., St. Paul, Minn., and N. Timenes, Waterbury, Conn., assignors to United States Rubber Co., New York, N. Y.

2,434,156. **Retreading Tires.** J. C. Heintz, Lakewood, O.

2,434,231. **Cast Vinyl Sheeting, Etc.** A. J. Seitz, assignor to Wingfoot Corp., both of Akron, O.

2,434,412. **Recovering Rubber from Guayule Shrub.** E. P. Jones, Salinas, Calif., assignor to the United States of America, as represented by the Secretary of Agriculture.

2,434,477. **Manufacture from Molding Powders of Molded Articles with Differently Shaded Zones therein.** U. A. M. Winter, assignor to Messrs. Hornflowa, Ltd., both of Maryport, England.

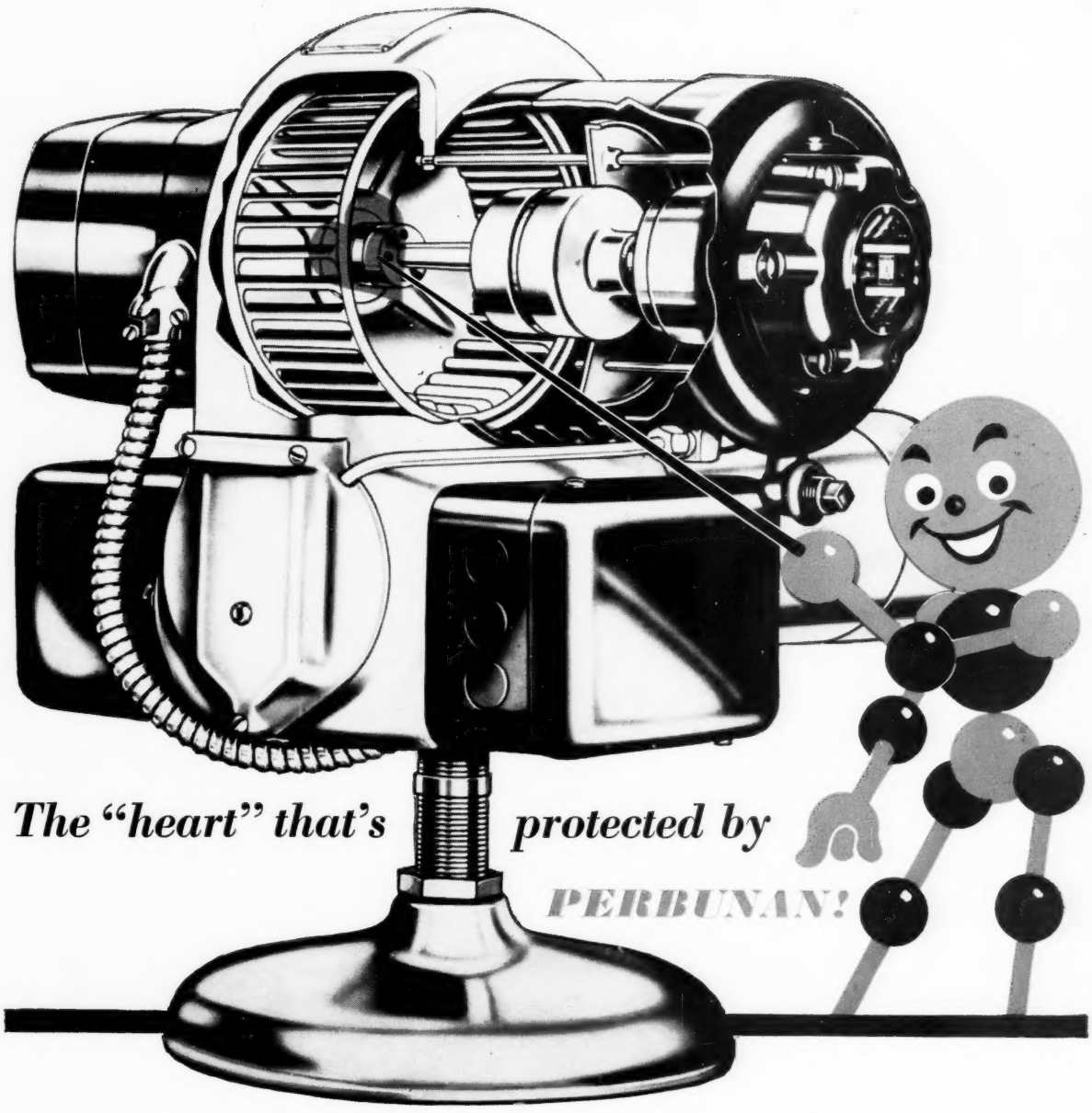
2,434,527. **Decorative Fabric with a Relief Design from Fabric Combined with Foam Rubber.** F. H. Untiedt, Chevy Chase, Md.

2,434,541. **Combining into a Unitary Strip of Predetermined Thickness Thin Component Strips of Plastic Material.** J. M. Bierer, Waban, assignor to Boston Woven Hose & Rubber Co., Cambridge, both in Mass.

Dominion of Canada

445,563. **Building a Tire.** F. W. Manning, Palo Alto, Calif., U.S.A.

445,742. **Continuous Process for the Pro-**



● The heart of the revolutionary and patented new Gilbarco Oil Burner is the "Economy Clutch" that practically eliminates soot. It allows the burner's fan to spin freely before the oil pump is engaged to produce the flame, and again lets the fan spin after the burner has shut off.

To ease the sudden impact of the first operation some part had to be developed that would have *resilience* to absorb shock . . . *flexibility* to maintain positive alignment . . . *strength* to hold the bond between the flexible and metal parts . . . and be *silent* in operation.

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duction of Rubberized Fabric. Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of J. W. Illingworth, Birmingham, Warwick, England.

446,017. **Particulate Coated Sheeted Material.** B. S. Cross and G. P. Netherly, assignors to Minnesota Mining & Mfg. Co., all of St. Paul, Minn., U. S. A.

446,208. **Rubber Wheel.** J. B. Bennett, Alhambra, and J. J. McCarter, assignors to W. G. L. Smith, both of Los Angeles, Calif., both in U. S. A.

446,271. **Shaping Articles Preliminary to Vulcanizing.** A. H. Crandall, Grosse Pointe Woods, Mich., U. S. A., assignor to Dominion Rubber Co., Ltd., Montreal, P. Q.

United Kingdom

595,629. **Compound Sheet Material.** Imperial Chemical Industries, Ltd., and J. H. McGill.

595,632. **Compound Sheet Materials.** Imperial Chemical Industries, Ltd., J. H. McGill, and J. W. Nash.

595,667. **Mechanically Stabilized Shapes from Polystyrene.** Plax Corp.

595,754. **Resin-Coated Fiber Base.** Carbide & Carbon Chemicals Corp.

595,835. **Extrusion of Plastic Materials from Presses.** C. F. Beswick and J. Holland.

596,108. **Cementing Polyvinyl Compositions.** Imperial Chemical Industries, Ltd., T. E. Atkinson, and B. J. Balfe.

CHEMICAL

United States

2,433,844. **Production of Organic Fluorine Compounds by Reacting in the Presence of a Peroxygen Catalyst a Polyfluoroethylene with an Aliphatically Saturated Organic Ether Compound.** W. E. Hanford, Easton, Pa., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,433,866. **Preparing Furfuryl Acrylate by Heating Methyl Acrylate and Furfuryl Alcohol in the Presence of a Catalytic Amount of Aluminum Tertiary-Butoxide and a Polymerization Inhibiter.** C. E. Rehberg, Philadelphia, and C. H. Fisher, Abington, both in Pa., assignors to the United States of America, as represented by the Secretary of Agriculture.

2,433,876. **For Use in the Manufacture of Material Resistant to Poisonous Gases, a Protective Layer Containing Lead Peroxide and a Compound of Hydrocarbons from the Group of Polyisobutylene, Polyisobutylene Nitrile, and Polyethylene Chloride.** R. Wechsberg, deceased, late of Amsterdam, Netherlands, by J. C. A. Buchner, administrator, Amsterdam, Netherlands; vested in the Attorney General of the United States.

2,433,910. **Putty Composition, Including a Polymerized Ester of Methacrylic Acid and a Filler Including Colloidal China Clay and Talc.** C. W. Johnson, East Brunswick Township, N. J., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,433,992. **Pigmentation of Polymers.** M. E. Hughes, San Jose, assignor to Shell Development Co., San Francisco, both in Calif.

2,434,054. **Polymerizing a Mass, the Polymerizable Portion of Which Consists Solely of Vinyl Acetate, in the Presence of a Peroxy Catalyst and Lauryl Mercaptan.** M. J. Roedel, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,434,106. **Impregnating Cellulosic Material with Styrene Monomer.** W. E. Flood, Metuchen, and E. Kosinszki, Fords, both in N. J., assignors to Catalin Corp. of America, a corporation of Del.

2,434,129. **Vulcanizing Butadiene-1,3 Copolymerized with an Organic Nitrile, Which Includes Heating in the Absence of Sulfur the Copolymer Having Incorporated a Halide of a Metal from the Group of Chlorides and Bromides of Metals of the Iron Subgroup, Manganese and Subgroups (b) of Groups 1 to 6 Inclusive of the Periodic Table.** M. C. Throdahl, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,434,145. **A Glycolic Ether of a Hydrolyzed Interpolymer of Ethylene and Vinyl Acetate.** D. D. Coffman, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,434,168. **The Condensation and Polymerization Product Formed at a Temperature of 250-300° C. under Vacuum of a Hydroxy Ether of Rosin Acid with a Pentaerythritol Group Polyhydric Alcohol.** W. Krumbhaar, New York, N. Y.

2,434,179. **Water-Soluble Hydroxyalkyl Ether of a Hydrolyzed Interpolymer of Ethylene and Vinyl Acetate.** W. H. Sharkey, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,434,197. **Removing Dark-Resin-Forming Constituents and Other Undesirable Components from a Resin Crude Containing Pinene.** E. L. Cline., Philadelphia, Pa., assignor to Allied Chemical & Dye Corp., New York, N. Y.

2,434,208. **For Preventing the Formation of Ice on a Metallic Airplane Propeller Blade, a Permanent Water Insoluble Coating Consisting of a Mixture of Polyisobutylene, Chlorinated Diphenyl, and a Plasticizer.** R. S. Gaugler, Dayton, and H. W. Guenther, Oakwood, assignors to General Motors Corp., Dayton, both in O.

2,434,247. **Elastic Nylon Articles.** J. R. Lewis, D. McCreath, and R. J. W. Reynolds, Blackley, Manchester, England, assignors to Imperial Chemical Industries, Ltd., a corporation of Great Britain.

2,434,424. **Separating Butadiene from a C_4 Hydrocarbon Mixture by Plural-Stage Extractive Distillation with Inverse Solvents.** R. C. Morris, Berkeley, and T. W. Evans, Oakland, assignors to Shell Development Co., San Francisco, all in Calif.

2,434,486. **Light Stable Compositions Including Polymeric Vinylidene Chloride or Vinyl Chloride and Certain 5-Substituted 2-Hydroxybenzophenones.** T. Houtman, Jr., assignor to Dow Chemical Co., both of Midland, Mich.

2,434,507. **2-Chloro-3-Iminobutyronitrile.** J. L. Mostek, Chicago, Ill., assignor to Sinclair Refining Co., New York, N. Y.

2,434,510. **Manufacture of Tertiary Dodecyl Mercaptan, Which Includes Condensing Tri-Isobutylene with Hydrogen Sulfide.** J. P. Olin, Grosse Ile, and J. L. Eaton, Trenton, both in Mich., assignors to Sharples Chemicals, Inc., Philadelphia, Pa.

2,434,522. **Diolefins.** W. D. Seyfried, Wooster, Tex., assignor to Standard Oil Development Co., a corporation of Del.

2,434,536. **Improved Method of Manufacturing Synthetic Rubber-Like Materials by the Emulsion Polymerization of a Conjugated Diolefin Hydrocarbon in the Presence of an Aliphatic Mercaptan Polymerization Modifier.** E. Arundale, Colonia, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,434,552. **Low-Temperature Polymerization Process for Polymerizing Isobutylene in the Presence of 150 to 400 parts of a Liquified Paraffinic Hydrocarbon Internal Refrigerant.** N. M. Elmore, Elizabeth, and H. C. Evans, Cranford, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,434,582. **Vulcanizable Polymer Obtained from a Chilled Mixture of Isobutylene, Isoprene, and Aluminum Chloride Catalyst Dissolved in Methyl Chloride, Which Is Produced in Free Space and Reacts to Form Vulcanizable Polymer in This Free Space.** R. F. Pfenning, Goose Creek, and M. R. Gertz, Baytown, both in Tex., assignors to Standard Oil Development Co., a corporation of Del.

2,434,606. **Condensing Hydrocyanic Acid and Acrylonitrile in the Presence of an Alkaline Condensing Agent to Form Succinonitrile.** E. L. Carpenter, Riverside, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,434,662. **Polyethylene Stabilized with Bis (Hydroxyphenyl) Propanes.** G. H. Latham and D. E. Strain, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,434,699. **Refining a Mixture of Unsaturated Acids of the Class of Higher Aliphatic Fatty Acids, Natural Resin Acids and Esters of the Acids for the Removal of Color Bodies.** R. H. Huff, Los Angeles, Calif.

2,434,736. **Extractive Distillation of C_3 Hydrocarbons.** K. H. Hachmuth, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.

Dominion of Canada

445,768. **Chloroprene Rubber Having Uniformly Dispersed therein a Product Obtained by Reacting Magnesium and an Oxide of Carbon in the Vapor Phase.** Permanente Metals Corp., Oakland, assignee of G. v. Stroh, Berkeley, both in Calif., U. S. A.

445,782. **Composition of Matter Including an Organo-Soluble Organic Plastic Dissolved in a Mixture of Methyl Isobutyl Ketone and Diisobutyl Ketone.** Shell Development Co., San Francisco, assignee of R. F. Buller, West Los Angeles, both in Calif., U.S.A.

445,787. **Electric Insulating Material, Including a Mixture of Polymerized Vinyl Chloride, a Plasticizer therefor, a Rubbery Solid Organic Polysulfhide, and a Plasticizer therefor.** Standard Telephone & Cables, Ltd., assignee of T. R. Scott and A. A. New, all of London, England.

445,840. **Rubber Compounding Material Readily Dispersible in Rubber at Temperatures below 150° F. and Including a Blend of Pitch, a High Molecular Weight Aliphatic Softening Agent, and an Aromatic Oil.** Allied Chemical & Dye Corp., New York, N. Y., assignee of A. B. Cowdery, Harwich Port, Mass., both in the U. S. A.

445,853. **Dielectric Sheet Material Consisting of Paper Impregnated with Copolymerized Mixture of 95% N-Vinylcarbazole and 5% Diallylphthalate.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of H. F. Miller and L. W. Foster, both of Pittsfield, Mass., U. S. A.

445,887. **For Packaging Hygroscopic Material, a Container Formed of Laminated Sheets, the Innermost Sheet Adjacent the Packaged Hygroscopic Material Containing a Plasticizer and a Continuous Barrier Film of Wax and an Elastomer.** Marathon Corp., Rothchild, assignee of W. H. Graebner, Neenah, and R. C. Flom, Menasha, all in Wis., U. S. A.

445,888. **Resinous Product Including a Polyvinyl Acetal Resin, a Partial Ester of a Polyhydric Alcohol, and an Unsaturated Aliphatic Acid and a Phenol-Aldehyde Reaction Product.** Monsanto Chemical Co., St. Louis, Mo., assignee of M. O. Debacher, Springfield, Mass., both in the U. S. A.

446,000. **Pressure Adhesive Tapes, Including a Base of an Organic Film-Forming Material and a Coating of a Solution of a Rubber-Like Tacky Polyvinyl Ether in a Solvent therefor, Which Swells but Does not Dissolve the Base.** C. E. Schildknecht and I. V. Runyan, both of Easton, Pa., assignors to General Aniline & Film Corp., New York, N. Y., both in the U. S. A.

446,034. **Films, Filaments, and Cast or Molded Objects from Artificial Resins Free from Nitrogen and Containing at Least One Substance Obtained by Strating from at Least One Ester of the Formula**

$$CH_2{=}C(R_1)\text{—}CO\text{—}O\text{—}R_2\text{—}N(R_3\,R_4)$$

Where R_1 Is Hydrogen or Hydrogen Residues, R_2 Is an Alkylene or Arylene Radical, R_3 and R_4 Are of the Group of Hydrogen, 2 Hydrocarbon Residues, and Hydroxylated Hydrocarbon Residues and Hydrocarbon Residues Joined to One Another by Lateral Linkage and Hydrocarbon Residues Joined by Cyclization. J. P. C. E. Corbiere, Lyon, assignor to Societe "Rhodiaceta", Paris, both in France.

446,092. **Chloroacetonitrile.** I. Hechenbleikner, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., U. S. A.

446,093. **Removing Acetylene Polymers from Crude Acrylonitrile.** E. L. Carpenter, Dumas, Tex., assignor to American Cyanamid Co., New York, N. Y., U.S.A.

446,108. **Resinous Condensation Product Obtained by at Least Partially Deesterifying in the Presence of an Acid Deesterifying Catalyst and a Carbonyl Compound, a Copolymer of a Monovinyl Ester of a Saturated Monocarboxylic Acid Containing not More Than Two Carbon Atoms with a Mono-2-Chloroallyl Ester of a Saturated Monocarboxylic Acid Containing not More Than Two Carbon Atoms.** W. O. Kenyon and W. F. Fowler, Jr., Rochester, N. Y., U. S. A., assignors to Canadian Kodak Co., Ltd., Toronto, Ont.

446,122. **For a Paper Liner Facing Material, a Coating Including a Paper-Adherent Layer of Oleoresinous Varnish, and a Top Coating Film of Plasticized Vinyl Resin.** C. E. Maier, Chicago, Ill., assignor to Continental Can Co., Inc., New York, N. Y., both in the U. S. A.

446,158. **Nuclear Substituted Dichlorostyrenes.** J. C. Michalek, Niagara Falls, assignor to Mathieson Alkali Works, New York, both in N. Y., U. S. A.

446,175. **Tough, Elastic, and Insoluble Polyvinyl Resin Formed by Treating a Hydrolyzed Polyvinyl Ester in Aqueous Solution with a Compound from the Group of Amino Phenols and Polyhydric Phenols.** A. H. Heatly and H. M. Collins, Shawinigan Falls, assignors to Shawinigan Chemicals Ltd., Montreal, both in P. Q.

446,180. **Recovery of Olefins from Gaseous Mixtures.** R. F. Robey, Roselle, assignor to Standard Oil Development Co., Linden, both in N. J., U. S. A.

446,181. **Separating Olefins from Gas Mixtures.** R. F. Robey, Roselle, and R. Rosen, Elizabeth, assignors to Standard Oil Development Co., Linden, all in N. J., U. S. A.

446,182. **Continuous Method of Segregating and Concentrating Butadiene.** E. V. Fasce and L. E. Pirkle, both of Baton Rouge, La., assignors to Standard Oil Development Co., Linden, N. J., U.S.A.

446,184. **Separating and Concentrating Isobutene.** I. P. Jones, Basking Ridge, and E. E. Willauer, Crawford, assignors to Standard Oil Development Co., Linden, all in N. J., U. S. A.

446,294. **Readily Extrudable Insulating Material, Including a Mixture of Polystyrene Rubber and Solid Polymers of Ethylene.** M. C. Field, London, England, assignor to International Standard Electric Corp., New York, N. Y., U.S.A.

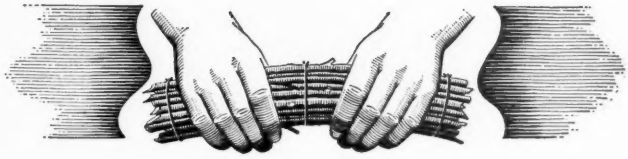
446,314. **Vulcanized Synthetic Rubber Prepared by Mixing a Butadiene 1,3 Polymerizate with a Tertiary Alkyl Phenol Sulfide, the Sulfur in the Phenol Sulfide Constituting at Least 30% of the Sulfur Present in the Mixture and Replacing a Corresponding Amount of the Sulfur Normally Required for the Vulcanizing Operation.** G. M. Wolf, Wyandotte, and T. E. Deger, Grosse Ile, Mich., assignors to Sharples Chemicals, Inc., Philadelphia, Pa., both in the U.S.A.

446,319. **Extracting Olefins from a Mixture of Olefins and Paraffins.** A. A. Draeger and W. B. Frankl'n, both of Baytown, Tex., assignors to Standard Oil Development Co., Linden, N. J., both in the U. S. A.

TALES WORTH RETELLING

(No. 2 of a series)

THE MEANING OF STRENGTH



A DYING OLD MAN gathered his sons around to give them some parting advice. He ordered his servants to bring in a Bundle of sticks.

"Break it," he said to his eldest son.

The son tried with all his might but was unable to break the Bundle. The other sons were also unsuccessful.

"Untie the Bundle," said the father, "and each of you take a stick."

"Now break," he said, and each easily broke his stick.

"You see my meaning," said the father.

★ ★ ★

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595,550. **Resinous Reaction Products of Aldehydes and Triazine Derivatives.** British Thomson-Houston Co., Ltd.

595,551. **Polymerization Process.** Distillers Co., Ltd., J. J. P. Staudinger and M. D. Cooke.

595,569. **Pressure-Sensitive Adhesive Masses.** Johnson & Johnson (Great Britain), Ltd.

595,607. **Continuous Process for the Manufacture of Synthetic Resins.** Girdler Corp.

595,631. **Piperidine Derivatives.** A. H. Stevens (Hoffmann-La Roche, Inc.).

595,689. **Polymers.** E. I. du Pont de Nemours & Co., Inc.

595,721. **Polymerization of Methylpentadienes.** Shell Development Co.

595,734. **Synthetic Resins.** Cellomold, Ltd., D. N. Davies, and F. S. Deutsch.

595,757. **Styrene.** Carbide & Carbon Chemicals Corp.

595,758. **Resins.** Shell Development Co.

595,788. **Dithio Acid Derivatives.** Wingfoot Corp.

595,854. **Stabilization of Polymerizable Aromatic Compounds.** Mathieson Alkali Works.

595,881. **Polymerizable Organic Materials and Polymers thereof.** Imperial Chemical Industries, Ltd., and R. Hammond.

595,925. **Coating Compositions and Coating Films.** British Celanese Ltd.

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595,989. **Spinnable Vinyl Resin Compositions.** Carbide & Carbon Chemicals Corp.

596,005. **Coating Solid Organic Polymers with Polysilicic Acid Esters.** E. I. du Pont de Nemours & Co., Inc.

596,007. **Resinous Compositions.** E. I. du Pont de Nemours & Co., Inc.

596,008. **Polymerization of 4-Vinylcyclohexene.** Imperial Chemical Industries, Ltd. (Canadian Industries, Ltd.).

596,055. **Vulcanization of Rubber and Synthetic Rubber.** United States Rubber Co.

596,113. **Flexible Polymeric Products.** A. Abbey (Dow Chemical Co.).

596,186. **Vinyl Chloride.** Soc. Anon. des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, Chauny & Cirey.

596,190. **Manufacture of Copolymers and Acceleration of Cure of Copolymers.** American Cyanamid Co.

596,233. **Elastomer-Carbon Black Mix.** General Tire & Rubber Co.

596,242. **Emulsions of Polyvinyl Resins.** Soc. des Usines Chimiques Rhone-Poulenc.

596,263. **Manufacture of Filaments, Foils, and the Like from Polymerized Vinyl Compounds.** Soc. Rhodiaceta.

596,264. **Dyeing and Coloring Artificial Materials.** Soc. Rhodiaceta.

596,282. **Nitroolefins.** Imperial Chemical Industries, Ltd., G. D. Buckley, and C. W. Scaife.

596,286. **Synthetic Resinous Reaction Products of Aldehydes and Triazine Derivatives.** British Thomson-Houston Co., Ltd.

596,295. **Synthetic Rubber-Like Materials.** Mathieson Alkali Works.

596,296. **Copolymeric Materials.** Mathieson Alkali Works.

596,303. **Nitraolefins.** Imperial Chemical Industries, Ltd., C. W. Scaife, H. Baldock (legal representative of H. Baldock), and A. E. W. Smith.

596,309. **Synthetic Resinous Reaction Products of Aldehyde and a Triazine Derivative.** British Thomson-Houston Co., Ltd.

596,361. **Resinous Condensation Products.** British Resin Products, Ltd., B. Frenkel, J. D. Morgan, C. E. Smith, and R. W. H. Wicking.

596,363. **Urea Formaldehyde Molding Composition.** L. Smidth.

596,365. **Synthetic Compositions and Products Having Molecularly Oriented Structures.** British Thomson-Houston Co., Ltd. (General Electric Co.).

596,377. **Polymerization of Unsaturated Organic Compounds.** Bakelite, Ltd.

596,461. **Substituted Polyhydric Phenols.** Mathieson Alkali Works.

596,463. **Removal of Conjugated Diolefins from Mixtures Containing Them.** S. A. Miller.

596,467. **New Polymerizable Organic Materials and Polymers and Copolymers thereof.** Imperial Chemical Industries, Ltd., and F. J. H. MacKereth.

596,471. **Aldehyde Condensation Products of 2-Aminoalkanes.** Lilly & Co.

MACHINERY

United States

2,433,936. **Plastic Extruder.** H. T. Tornberg, Cuyahoga Falls, O., assignor to Modern Plastic Machinery Corp., Wilmington, Del.

2,433,937. **Machine for Making Sheets of Extruded Plastics.** H. T. Tornberg, Ridgewood, N. J., assignor to Modern Plastic Machinery Corp., Wilmington, Del.

2,434,073. **Apparatus for Making Insulated Cable.** H. D. Isenberg, Wilmette, Ill.

2,434,707. **Apparatus for Continuously Milling and Conveying a Plastic.** W. R. Marshall, Bloomfield N. J. assignor to Bakelite Corp., a corporation of N. J.

Dominion of Canada

445,721. **Apparatus for Producing a Molding of Thermoplastic Insulating Material.** British Insulated Cables, Ltd., Prescott, Lancashire, assignee of G. H. Walton and J. C. Quayle, both of Helsby, Cheshire, and P. Jones, Kelsall, near Chester, all in England.

445,765. **Injection Molding Machine.** Leominster Tool Co., Inc., assignee of L. J. Caron, both of Leominster, Mass., U.S.A.

445,878. **Apparatus for Extruding Plastic Moldable Material into a Cavitied Mold.** B. F. Goodrich Co., New York, N. Y., assignee of O. E. Hermanns, Akron, and E. Herzog, Cuyahoga Falls, both in O., both in the U.S.A.

445,879. **Tool for Manipulating Rubber-Like Sheet Material.** B. F. Goodrich Co., New York, assignee of F. S. Sternad, Cuyahoga Falls, O., both in the U.S.A.

445,994. **Dipping Apparatus for Molded Rubber Goods.** S. McMordie, Arlington, and D. A. Peterson, Chelsea, assignors to Dewey & Almy Chemical Co., Cambridge, all in Mass., U.S.A.

446,056. **Machine for Continuously Molding a Material Like Rubber to Form a Sheath for a Wire or a Cable.** B. W. Benbow, Benbow, Calif., U.S.A.

446,138-139. **Extruder.** F. T. Griffiths, Gravesend, Kent, assignor to W. T. Henley's Telegraph Works Co., Ltd., Dorking, Surrey, both in England.

446,273. **Portable Vulcanizing Frame for Supporting Footwear so That Air Can Be Exhausted from the Interior of the Articles during Vulcanization.** S. S. Miner, Mishawaka, Ind., U.S.A. assignor to Dominion Rubber Co., Ltd., Montreal, P. Q.

446,275. **Molding or Die Casting Machine.** S. Smith and W. H. Cockerill, assignors to E. M. B. Co., Ltd., all of West Bromwich, Stafford, England.

United Kingdom

595,650. **Molding Machines for Plastics and Other Moldable Materials.** W. S. Renier.

596,032. **Retread Vulcanizer.** General Tire & Rubber Co.

596,289. **Apparatus for Making Power Transmission Belts.** Wingfoot Corp.

596,383. **Apparatus for the Manufacture of Endless Cable Casings.** A. C. Hussnigg.

UNCLASSIFIED

United States

2,433,980. **Coupling for Cables.** L. G. Brazier and D. T. Hollingsworth, assignors by mesne assignments, to British Insulated Callender's Cables, Ltd., all of London, England.

2,434,017. **Anti-Skid Tire Device** C. Q. Snedeker, Canton, O.

2,434,091. **Knot or Slub Catcher.** C. J. Arrington, Winnsboro, S. C., assignor to United States Rubber Co., New York, N. Y.

2,434,180. **Tire Carrying Rim.** C. W. Sinclair, assignor to Kelsey-Hayes Wheel Co., both of Detroit, Mich.

2,434,219. **Hose Coupling.** F. C. Morrison, Babbitt, Nev.

2,434,365. **Vacuum Apparatus for Filling Tires with Water.** W. W. McMahan, assignor to Wingfoot Corp., both of Akron, O.

2,434,640. **Machine to Strip Covered Cables.** H. A. Burdwood, Portland, Me.

2,434,742. **Electrical Connector for Coaxial Cables.** E. G. Hills, assignor, by mesne assignments, to Belmont Radio Corp., both of Chicago, Ill.

United Kingdom

595,534. **Device to Polish Rims of Vehicle Wheels and Like Rings.** Dunlop Rubber Co., Ltd., A. Shackleton, and G. H. Whale.

595,800. **Tire Levers.** F. M. Doone.

595,035. **Connector Ends for Flexible Tubing.** Gas Light & Coke Co. and C. R. Austen.

Dominion of Canada

445,822-823. **Wheel Structure.** G. A. Lyon, Allenhurst, N. J., U.S.A.

445,939. **Vehicle Wheel.** C. S. Ash, Milford, Mich., U.S.A.

445,945. **Electric Tire Manometer.** P. R. Dutour, Rimouskim, P. Q.

446,232-235. **Wheel Structure.** G. A. Lyon, Allenhurst, N. J., U.S.A.

446,274. **Adjustable Pipe Clamp.** F. T. Newell, Bradford, Pa., assignor to Dresser Industries, Inc., Cleveland, O., U.S.A.

TRADE MARKS

United States

434,831. **Fayo.** Trusses. Brooklyn Truss Co., Brooklyn, N. Y.

434,835. Representation of a label containing the word: **"Forgonli."** Surgical corsets and girdles, trusses, braces, abdominal belts, etc. M. J. Prevost, doing business as Marie's Shoppe, Plainfield, N. J.

434,842. **Phenac.** Phenolic resins. American Cyanamid & Chemicals Corp., assignor to American Cyanamid Co., both of New York, N. Y.

434,843. **Presto.** Sponges. Presto Mfg. Co., New York, N. Y.

434,867. **Uformite.** Synthetic resins for coatings and adhesives. Resinous Products & Chemical Co., Philadelphia, Pa.

434,882. **Natac.** Natural rubber bloom softener, tackifier, and inhibiter. J. M. Huber, Inc., New York, N. Y.

434,918. **Forbidden.** Surgical gloves, prophylactic articles, etc. Veralin, Inc., Chicago, Ill.

434,939. **Fiber-Plast.** Resin plastic binder. International Textile Co., Chicago, Ill.

434,957. **Stat.** Douches. J. T. Weeks, doing business as J. T. Weeks Laboratories, Jackson, Miss.

434,970. Representation of a label containing the word: **"Lestreflex."** Bandages. A. De St. Dalmas & Co., Ltd., Leicester, England.

434,972. Representation of a label containing the word: **"Chameo."** Tire pumps. Chatsworth Mfg. Co., Chatsworth, Ga.

435,006 **569.** Extender. Interchemical Corp., New York, N. Y.

435,021. Representation of an oblong containing a warrior head and the words: **"The Gold Trojans."** Prophylactics. Youngs Rubber Corp., New York, N. Y.

435,029. **Solvene.** Adhesive tape remover. Day Chemical Co., Newark, N. J.

435,044. **Wonderform.** Sanitary belts. International Cellucotton Products Co., Chicago, Ill.

435,055. **Teleseal.** Insulated wire. Whitney Blake Co., Hamden, Conn.

435,056. **Thermoprene.** Insulated wire. Whitney Blake Co., Hamden, Conn.

435,061. **DMP.** Substituted aminomethylphenols. Rohm & Haas Co., Philadelphia, Pa.

435,104. **Indubond.** Plastic coating compounds. Industrial Lining Engineers, Inc., Edgeworth, Pa.

435,116. Representation of a label containing the words: **"Latre," "At Your Service," "Aco,"** and **"American Hard Rubber Co."** Trays. American Hard Rubber Co., New York, N. Y.

435,147. **Futuro.** Supporters, trusses, etc. Jung Arch Brace Co., Cincinnati, O.

435,175. **Wald.** Bicycle, automobile, and motor-cycle accessories. Wald Mfg. Co., Inc., Maysville, Ky.

435,191. **Polynide.** Vinyl-type plastic film. Fidelity Plastics Co., Salem, Mass.

435,193. Representation of a circle containing the word: **"Sepco."** Vulcanizers and mold-heaters. Automatic Electric Heater Co., Inc., Pottstown, Pa.

435,198. Representation of a circle containing the word: **"Sorosis."** Heels. A. E. Little doing business as A. E. Little Co., Lynn, Mass.

435,199. **Beuta-film.** Vinyl-plastic. Hartford Textile Corp., New York, N. Y.

435,200. **Vita-Guard.** Plastic film garments. A. L. Siegel Co., Inc., New York, N. Y.

435,203. **Same Process.** Footwear. S. L. Kleven, Hallowell, Maine.

435,204. Representation of an owl and the words: **"Educator shoes,"** and **"train footsteps."** Educator Shoe Corp. of America, New York, N. Y.

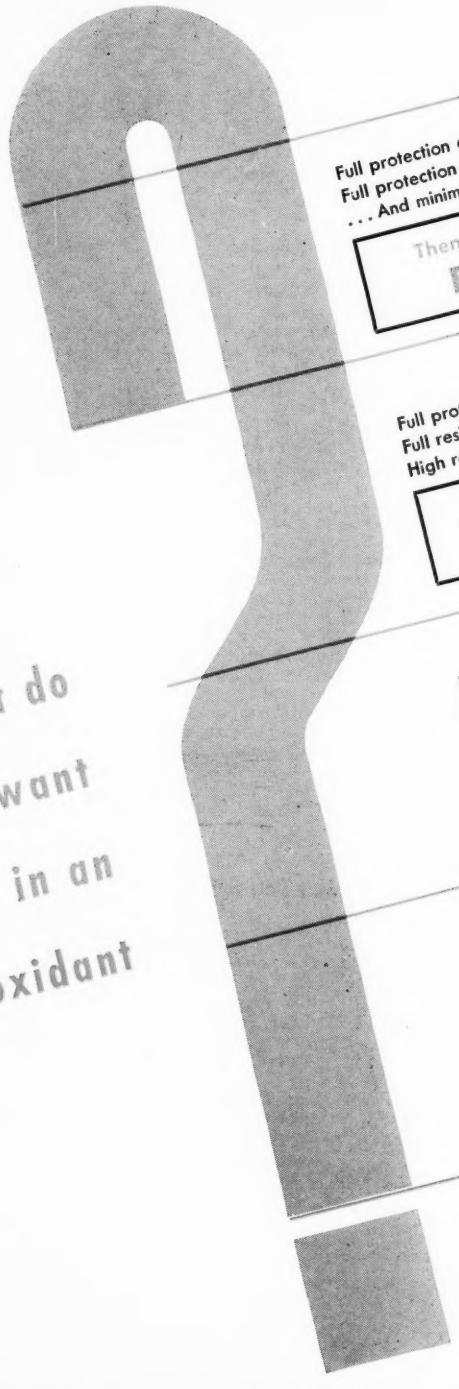
435,208. **Academy Award.** Tires, belting, hose, etc. Academy Award Products, Inc., New York, N. Y.

435,231. **SCI- -RES.** Footwear. Endicott Johnson Corp., Endicott, N. Y. **Scientific Research**

435,238. Representation of a fanciful design and the word: **"Omni."** Pyroxylin coated cotton piece goods. Omni Products Corp., New York, N. Y.

435,240. **Artgum.** Erasers. Rosenthal Co., New York, N. Y.

435,247. **Perfum-atic.** Atomizers. Kent Creations, Inc., New York, N. Y.



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Offer your customers more for their money and the sales are yours. An easy way to do this is to give rubber moldings a better and more salable appearance.

You can give your products added sales appeal by using Dow Corning Mold Release Emulsion No. 35 in molding rubber goods. Baldwin Rubber Company of Pontiac, Michigan and most of the other leading rubber companies have learned that improved appearance is one of the advantages of this silicone release agent. They have found that Emulsion No. 35 keeps molds cleaner longer than any other mold release agent. For that reason each molded part has a uniformly better finish whether it's the first or the last part of a production run.

In addition to lowering the cost of mold maintenance and improving the appearance of molded rubber parts, DC Mold Release Emulsion No. 35 reduces scrap to an absolute minimum. It practically eliminates fold-overs and non-knits resulting from improper lubricating. And it gives such easy release that change time is substantially reduced with very little danger of tearing heats when removing them from the cavity.

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New Machines and Appliances

Variable Speed Changer

New Size H-6 Link-Belt P.I.V. Gear Variable Speed Changer

THE Link-Belt Co. 307 N. Michigan Ave., Chicago 1, Ill., has announced the production of a new Size H-6 unit in its line of Link-Belt P.I.V. Gear variable speed changers. The H-6 unit is rated at 20 h.p. for speed variation ratios of 5:1 and 6:1, and at 25 h.p. for ratios of 2:1, 3:1, and 4:1. The new unit is made only in a plain, basic horizontal assembly. The housing consists of a top and a bottom half, instead of the central housing and side-plate construction employed on the smaller P.I.V. Gear sizes.

With the addition of the H-6 unit, the company's line of P.I.V. Gear variable speed changers now embraces eight sizes. The other seven sizes, ranging from 0.5-15 h.p. capacity and having ratios up to 6:1, are available in five assembly types, all suitable for either horizontal or vertical mounting. All units are compact, of all-metal construction, fully enclosed, and self-lubricating. The seven smaller sizes are described in the company's bulletin, Link-Belt P.I.V. Gear Book No. 1874, and a supplemental Folder No. 1874-A is available covering the new H-6 unit.

New Deci. Log Log Slide Rule

A NEW deci. log log slide rule that simplifies computations is announced by Pickett & Eckel, Inc. The scales on the front of the rule are so arranged that one setting of the hairline gives a number's square root, cube root, and logarithm. The log log scale on the back is expanded for greater accuracy and arranged to give the following five readings with each setting: (1) decimal fraction to four and five figures; (2) reciprocal number to four and five figures; (3) logarithm; (4) co-logarithm; and (5) natural logarithm to base.

The scales on the rule read from one ten billionth to ten billion and give decimal point location. A simple legend tells which scale to read when raising numbers to powers. The rule

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FOR FURTHER DETAILS, SEE AD ON PAGE 692

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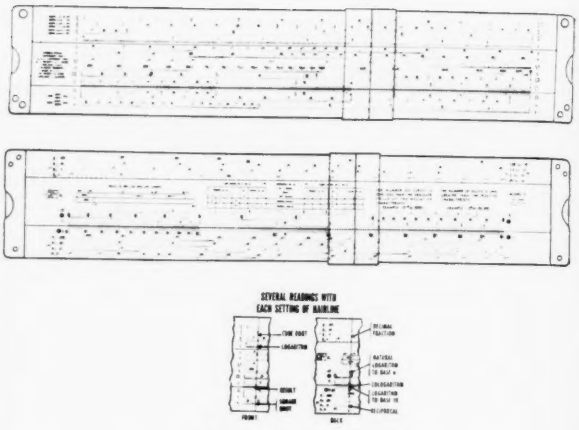
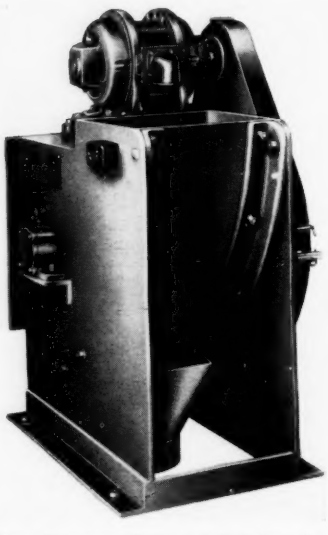


Pickett & Eckel Slide Rule

is made of magnesium alloy with plastic surfaces bearing permanent, easy-to-read, washable scales. Size of the rule is 12⅛ by 2⅛ by 3/16 inches. It comes complete with a carrying case and an illustrated instruction manual.



New American Pick and Roll Dry Ice Crusher

Dry Ice Crusher

THE American pick and roll dry ice crusher, designed to provide rapid conversion of dry ice, has been announced by American Pulverizer Co., 1535 Macklind Ave., St. Louis, Mo. Improvement over conventional methods is attained by the "pick and roll" action which, in addition to being faster, assures significant savings in shrinkage loss and in labor and reduces dry ice blocks to usable, uniform sizes, the manufacturer claims. The unit will crush 200 pounds of dry ice in 15 seconds, and the consequent reduction in labor and shrinkage loss will go far to help solve one of the rubber processer's most persistent problems in the use of dry ice for the defining of rubber products that are freshly molded.

The unit is only 50 inches high. The crushing elements are manganese steel rings which apply centrifugal force at right angles to a horizontal shaft. The crusher is made of heavy steel plate with sectional design, welded construction, and dusttight machine joints. Any contact with solid metal or foreign material causes a momentary deflection of the rings and an automatic rejection of the material from the crushing chamber into a special trap. Ready access to the crushing chamber is provided without removal of the feed chute or hopper. The unit is so constructed that no shear pins, toggles, gears, or other safety devices are required.

"Summary of Technical and Patent Assets. 1948 Edition." Phillips Petroleum Co., Bartlesville, Okla. 238 pages. This handsome, illustrated booklet gives a classified listing of the company's patents, giving title, number, date, and patentee. A brief review of the company's services and resources also appears, and there are indices of patents and patentees.

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EUROPE

FRANCE

Hildenbrand and Delattre Address Rubber Engineers

The Association Francaise des Ingénieurs de Caoutchouc has inaugurated a series of monthly meetings to be held during 1947-48. The first of these took place on October 30, 1947, when two papers were presented.

The first, "A New Method of Protecting Rubber against Oxygen," by R. Hildenbrand, discussed results of original work carried out at the Institut Français du Caoutchouc on mercaptobenzimidazole. This product is considered by German workers to be an antioxidant, but it is held really to belong to that class of substances which Le Bras termed "deactivators," that is, substances which, while protecting vulcanized rubber from deterioration by oxygen, do not oppose the combination of oxygen with rubber; they convert the active peroxides capable of completely degrading the molecule into simple oxides, which to some extent has the effect of deactivating the peroxides as soon as they are formed.

Tests showed that a combination of an antioxidant and a deactivator resulted in considerably improved protection against oxygen. Whenever mercaptobenzimidazole was added to an antioxidant, aging was superior to that obtained by either of the two substances; this was independent of the type of accelerator used and the curing time.

It was further observed that mercaptobenzimidazole activated basic accelerators and retarded acid accelerators; it gave no protection against aging to vulcanizates of rubber and sulphur alone. Other tests carried out as a result of these findings brought out the indispensable part played by zinc oxide, which suggests the formation of a zinc salt by reaction with the mercaptan acid group during vulcanization.

Mr. Hildenbrand showed that the deactivating effect is in reality not produced by the mercaptobenzimidazole itself, but by its conversion products during vulcanization. He pointed out that knowledge of the deactivating effect helps explain why certain accelerators, like the thiazoles and the thiurams, confer good aging resistance.

Finally, tests indicated that the combined use of an antioxidant and a deactivator also leads to a decided improvement in resistance to flexcracking.

In the second paper, "The Manufacture of Synderme and Texoides with Natural and Synthetic Latices," M. Delattre discussed the chief problems in connection with the preparation of these products. Synderme (imitation leather) is made of ground leather treated to form a paste to which are added a binder containing a protective colloid and a flocculating agent, and the whole is vulcanized. The binder may be a natural or synthetic rubber latex or a resin emulsion, though natural rubber latex is held to be the best because vulcanization here offers no difficulties. The process for making Synderme is simple enough, but it is necessary to take various precautions in order to obtain the desired results.

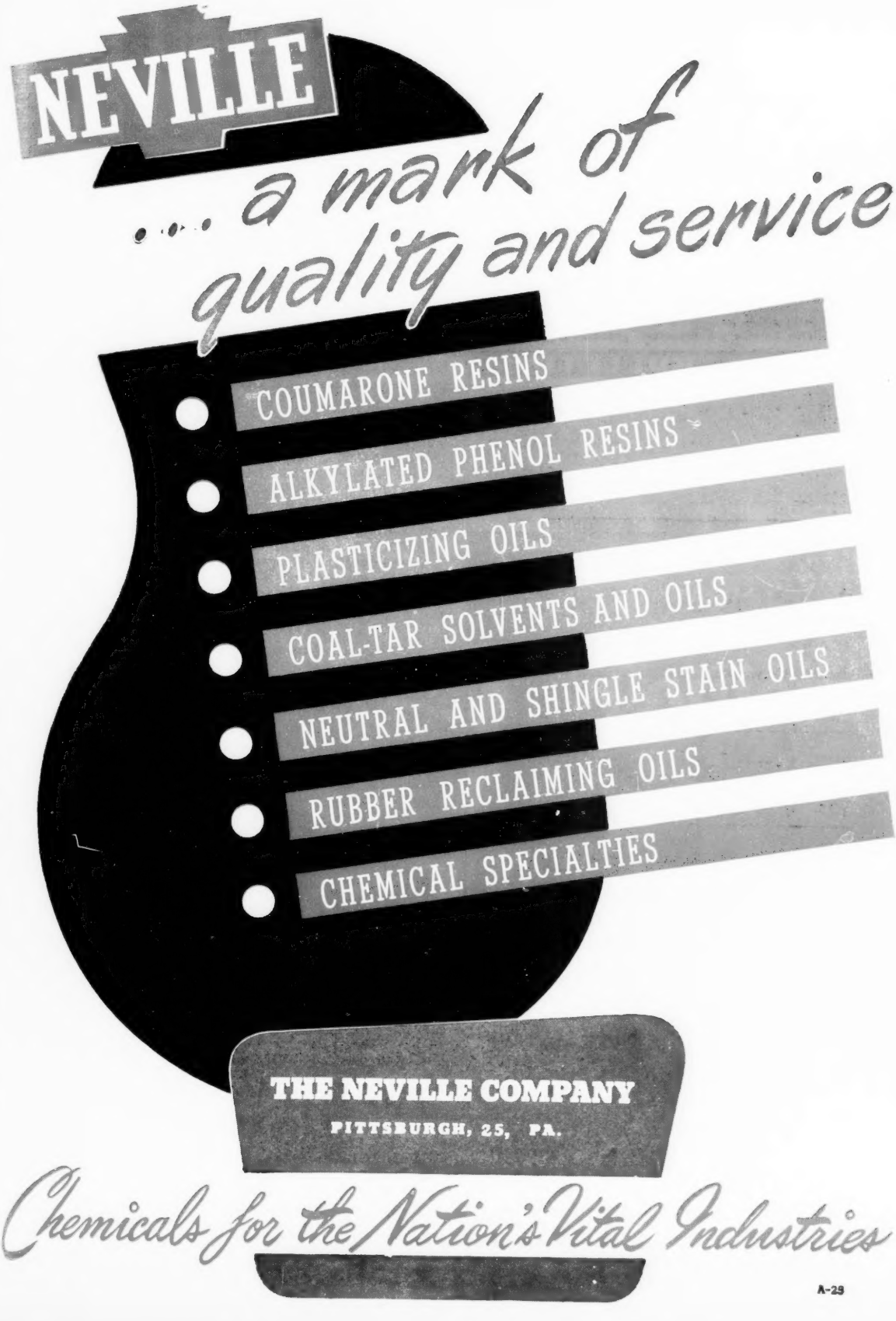
The Texoides are sheets of textile fibers (cotton or ramie) impregnated with latex sprayed from a battery of sprayguns on to the material while the latter is supported on a conveying band. The coated sheet is then rolled on to a drying drum and heated to about 100° C.

Growing Production of Tires and Other Rubber Goods

It is whispered in France that if no hitch occurs, something like 30% of the French output of automobiles may be reserved for home consumption this summer, and the tires for them will be there too.

Reports of tire production in the first nine months of 1947 have been very gratifying. The five largest tire manufacturers, Michelin, Kleber-Colombes, Dunlop, Bergougnan, and Hutchinson, together are said to have exceeded the country's prewar level of production. Against 1938 average monthly output of 2,831 tons of tires for automobiles and motor cycles, an average of 3,439 tons is reported for the first nine months of 1947, most of which was exported.

Production of other rubber goods has not yet reached the prewar level; the comparative monthly averages were 7,197 tons in 1938 and 6,000 tons over the first three quarters of 1947.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The role of Oxidation in Drying Oils
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Are Heated Ceilings New?

In its issue of August, 1947, *Revue Générale du Caoutchouc* reproduced from India RUBBER WORLD an item on the new method of radiant heating by means of electrically heated ceilings developed by United States Rubber Co. Then in its November, 1947, issue, the French paper gives space to some observations on the subject by the N. V. Hollandsche Draad en Kabel Fabriek (Dutch Wire & Cable Works), Amsterdam, Holland. The Dutch company points out that the heated ceilings are not really new as it had well before the late war installed heating systems in which the source of heat was a cable sheathed in lead and coated with a special rubber compound resistant to high temperatures and concealed in the ceiling, walls, or floor of the space to be heated. Its Drake cable, first marketed in 1929, was used for heating soils, and in Holland large horticultural installations made use of this equipment. Some years later Drake cable was also used for heating houses and churches and to protect water mains against freezing in winter.

Notes on the French Rubber Industry

On October 23, 1947, a large gathering of leaders in scientific literary, intellectual, and economic circles met in the National Museum of Natural History, Paris, to honor Prof. August Chevalier, who had just completed 50 years at the Academie des Sciences. Professor Chevalier rendered valuable services to his country and to sciences by his studies of the natural resources of the French colonies. In the rubber world he is known especially for his work on African rubbers. The celebrations were concluded by the award to Professor Chevalier of a suitably inscribed medal bearing his head on one side and a map of Africa on the other.

Henri Balay, for the past seven years president of Syndicat du Caoutchouc, has resigned his office for reasons of health. He is succeeded by Henri Jacquesu, vice president of the organization.

The Société Anonyme Française pour l'Importation du Caoutchouc Alcan & Cie., importer of crude rubber, balata, gutta percha, etc., recently celebrated its one-hundredth anniversary. The firm was started in 1847 by the Hecht brothers with offices in London, Paris, and Havre. At first they dealt in various overseas products, but soon began to specialize in wild rubber. The business operated under the name of Hecht Frères et Cie. until 1914 when Emile Alcan married into the family and the firm became Société Alcan et Cie., taking its present form in 1938 when its capital was raised to 17,000,000 francs; a further increase in 1947 brought the capital to its present figure, 34,000,000 francs. The firm has not confined its activities to crude rubber and the like, but has also set up a special division to handle chemical products, among others those of E. I. du Pont de Nemours & Co., Inc., and the local Franterre. The S.A.F.I.C. Alcan et Cie. has close ties with Hecht, Levis & Kahn of London and New York, and rubber concerns in Malaya and Singapore and has interests also in other parts of Asia and in Africa.

GREAT BRITAIN

On Honors List

Among those included in the New Year's Honors List was Sidney Albert Brazier, technical manager of Dunlop Rubber Co., Ltd., who received the O.B.E. Mr. Brazier has been with Dunlop since 1919 and was for many years chairman of the technical committee of the India Rubber Manufacturers' Association and continued in that position when the Federation of British Rubber Manufacturers' Associations was formed.

Sir Eric Mieville received the G. C. I. E. He was Principal Secretary to Lord Mountbatten in India and is a director of the British Tire & Rubber Co. and of the India Rubber Gutta Percha & Telegraph Works Co.

J. J. Grundy, until recently distribution manager of alkali and general chemicals division, Imperial Chemical Industries, Ltd., and F. J. Robinson, director and general works manager of Bakelite, Ltd., also were awarded the O. B. E.

The B. E. M. (British Empire Medal) went to H. Davies, process operator, Monsanto Chemicals Ltd.; R. Davies, cable machine operator, British Insulated Callenders Cables, Ltd.; and J. Moran, operative, Dunlop Rubber.

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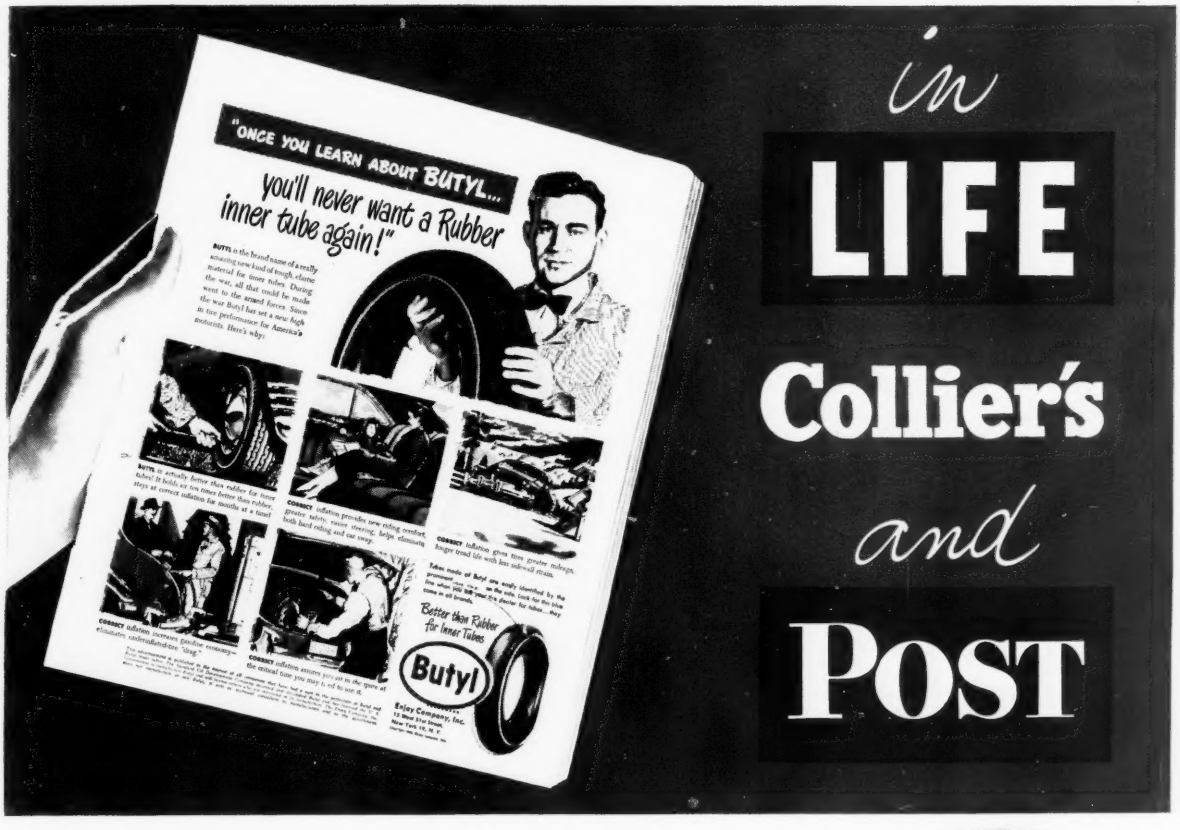

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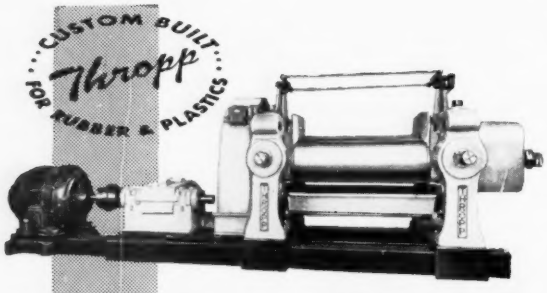

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Lecture Courses on Rubber

On February 10, at the Polytechnic, London, L. R. G. Treloar gave the first of a series of six lectures on the "Physics of Rubber."

The Northern Polytechnic, London, is offering a special course of lectures on "Methods of Rubber Research," when prominent rubber technologists will deal with problems in which they are particularly expert. The schedule follows:

January 28. "Functions of Cooperative Industrial Research," J. R. Scott, director of research, Research Association of British Rubber Manufacturers.

February 4. "Development of Hardness Tests," A. L. Soden.

February 11. "Development of Plasticity Tests," R. W. Whorlow.

February 18. "Meaning of Test Results. I. Errors in Testing. (*February 25*) II. Planning Experiments". R. G. Newton.

March 3. "How to Use Technical Literature Services," T. H. Messenger.

March 10. "How to Investigate Works Problems," R. C. Moakes.

March 17. "Application of Infra-Red Spectometry to Rubber Problems," J. Mann.

April 14 and 21. "Relation between Chemical Structure and Physical Properties of Rubber," W. C. Wake.

April 28 and May 5. "Dynamic Properties of Rubber," L. Mullins.

Business News Notes

De La Rue Insulation, Ltd., has increased its capital by £1,200,000 in £1 ordinary shares, beyond the registered capital of £300,000.

P. B. Cow & Co., has acquired Elliott Equipment, Cardiff, manufacturer of Numax inflatable chairs and inflatable airbeds.

J. Arthur Redfern has retired from Redfern's Rubber Works. He is succeeded as managing director by Thomas H. Redfern, his nephew and a son of the founder of the firm, Wilfred Redfern.

In line with its aim to strengthen the position of the foremen as an integral part of management, Dunlop Rubber Co., Ltd., plans a program of visits by Fort Dunlop foremen to other Midland factories, and they are also to meet foremen from other industries who are coming to Fort Dunlop during the year. In addition a series of morning talks is being given on the rubber industry and labor matters in general.

A new type of rubber suit for airmen brought down in the sea has recently undergone successful tests by the R.A.F. From available information it appears that the inflatable rubber suit is a development of the "Mae West" and insulates against cold as well as providing buoyancy.

A new factory at the Carse, Inverness, Scotland, is to utilize scrap wood for the manufacture of plastic board for housing and for plastic goods. The factory, which is reportedly to be built by a London firm, will give employment to between 500 and 600 persons.

The British Export Trade Research Organization is starting its third year of full activity with about 300% more work on hand than nine months ago, it is learned. With the increasing support of manufacturers and business associations and the government financial assistance on which B.E.T.R.O. can call until 1952, the organization is in a sound position for still further development.

Lacrinoid Products plans absorbing Insulating Equipment by the purchase of the latter's capital for £57,000. To finance the deal Lacrinoid will have to increase its capital to £250,000.

W. G. Ingram, Ltd., has been formed with a capital of £1000 to carry on the business of planters of rubber, gutta percha, balata, etc., and cotton and other fibrous substances. The directors are G. Ingram, Sr., G. Ingram, Jr., and W. A. Ingram, all directors of Lea Bridge Rubber Works, Ltd., and Ada M. Ingram.

International Bulk Liquids (Storage & Transport), Ltd., has been organized to import, transport, and deal in latex, oils, bitumens, and other liquids and manufacture and deal in rubber and rubber goods. Directors are G. Gill, rubber broker, Wm. Binns, and Eric Harvey.

British Tire & Rubber Co. reports net profits for the year ended September 30, 1947, amounting to £664,536, against £313,129 in the preceding fiscal year. The net figure is arrived at after providing for E.P.T. and profits tax, but before charging income tax. The total ordinary dividend was 20%, against 15% for 1945-46.

British Industrial Plastics for the year ended September 30, 1947, paid an ordinary dividend of 20%, against 12% in the preceding fiscal year. Gross profit was £506,469, against £391,146.

After providing £74,213 for depreciation, £22,611 for research, etc., £142,000 for taxation, net profit came to £79,296, against £34,784 in 1945-46.

Durham Raw Materials, Ltd., recently was formed in association with Harrisons & Crosfield, Ltd., to act as world distributers of the products of Durham Chemicals, Ltd., Birtley, Durham, and of its overseas branches formed in 1947, Durham Chemicals (Canada), Ltd., and Durham Chemicals Australia Pty., Ltd. Durham Raw Materials has a capital of £100,000, and its first directors are Sir Leonard G. Paton, J. F. E. Gilchrist, G. F. H. Cumming, N. Dawson, J. F. E. Ruffell, and R. L. F. Nye. Durham Chemicals, formerly known as the Newcastle-upon-Tyne Zinc Oxide Co., produces zinc oxide, factices, and other rubber chemicals. Its subsidiary, Typke & King, Ltd., has the sole agency in the United Kingdom for rubber chemicals manufactured by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U. S. A.

The Federation of British Manufacturers of Sporting Goods is now settled in larger quarters at Panton House 25, Haymarket, London, S.W.1. The organization plans a members' room, in which out-of-town members without London offices may transact business.

The British Rubber Development Board, according to Secretary G. S. Cook, has moved to Market Bldgs., Mark Lane, London, E.C.3.

P. B. Cow & Co., Ltd., manufacturer of rubber products, reports that on January 14 at its Streatham Common, London, S.W.16, premises, where the company started its activities in 1836, it gave a dinner to mark the retirement from service of Cashier I. J. Bush, who had been continuously employed by the company for 61 years. The affair, attended by about 50 employes, was confined entirely to directors, senior executives, and workers with more than 20 years' continuous service. Among the speakers were Managing Director F. B. P. Weil and General Manager T. W. Fazakerley.

FAR EAST

MALAYA

Strikes Harass Rubber Industry

Sporadic strikes harried the rubber industry in the latter part of 1947. In October occurred a series of strikes in the Singapore area, among others at Dunlop Rubber Co.'s dockside go-down where 400 women workers were out more than a month, but returned after agreements between the company and the Rubber Workers' Union. At a remilling factory which had to close last September for lack of business, 200 "squatters" demanded four

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Diamyl Phenol

A Useful Chemical for the Rubber Industry

Koppers Diamyl Phenol is a mixture of dialkylated phenols, the alkyl groups of which include both the secondary and tertiary amyl isomers. This mixture of high-boiling, alkylated phenols is a straw-colored, slightly viscous liquid possessing a mild phenolic odor. Diamyl Phenol undergoes reactions such as hydrogenation, esterification, condensation with aldehydes, sulfurization, and poly-ether formation.

The following suggestions are made for its possible use by the Rubber Industry—

IN COMPOUNDING

FOR PLASTICIZING—Diamyl Phenol and its phosphate esters are useful as plasticizing or swelling agents for synthetic rubbers. The phosphate esters are also suggested as plasticizers for vinyl polymers.

FOR SOFTENING BUTYL RUBBER—Diamyl Phenol has been reported to be of value in the compounding of Butyl-type polymers, in which it serves as a softening agent.

FOR VULCANIZING—Numerous studies have been made of the use of sulfides of alkylated phenols as primary vulcanizing agents for synthetic rubbers. The polysulfides of Diamyl Phenol are suggested for further evaluation.

FOR STABILIZING—Lead phenates prepared from Diamyl Phenol are suggested as stabilizers for mixtures of GR-N type polymers with vinyl polymers.

FOR PHENOLIC RESINS—Modified phenolic resins are finding increasing use as vulcanizing agents for natural and synthetic rubbers. Diamyl Phenol is suggested for the modification of phenolic resins used for such purposes, particularly for the production of ebonites.

IN RECLAIMING

FOR PEPTIZING AGENTS—Phenol sulfides produced by the reaction of Diamyl Phenol with sulfur chlorides are effective peptizing or dispersing agents for both natural and synthetic vulcanizates. These sulfides accelerate the reclaiming processes.

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months' "pocket money" and free food instead of notice. They finally agreed to accept one month's pay less cost of food supplied them since the factory closed. Two other strikes were accompanied by rioting.

Several strikes also took place on rubber estates, chiefly owing to wage cuts introduced following the drop in rubber prices about the middle of the year. In the beginning of December, 1947, the Malayan Planting Industries Employers' Association decided to restore cuts, and wages of contract tappers were brought back to levels prevailing in June, 1947. Wages to daily paid workers, other than Chinese, have been fixed at $1.20 (Straits currency) for men, $1.05 for women and 60-75 cents for children; the pay includes cost of living allowance. Daily paid male tappers now will get a maximum of $1.45, women $1.30, children 80 cents to $1.00, provided this does not mean a downward revision. These rates also include cost of living allowance.

Warning on Excess Latex Production

That there is danger of over-production of latex in Malaya was the view expressed during an interview in the *Straits Times* a few months ago by F. Waterhouse, of Fred Waterhouse & Co. Mr. Waterhouse compared the situation with that which has developed in the rubber remilling industry where big profits made soon after reoccupation encouraged owners to rehabilitate factories regardless of cost until capacity finally exceeded supplies. Altogether 13 remilling factories started operations on the Island of Singapore, but a few of the less efficient had to shut down.

In the case of liquid latex, supply was overtaking demand, he said, with prices at the lowest level although at the time the price of smoked sheet had recovered from its earlier decline. With many new latex installations under construction and the expansion of prewar latex plants, the latex industry was expected to become highly competitive before long.

Mr. Waterhouse added a further warning—that manufacturers would not use a maximum amount of latex until they were assured of adequate supplies of good-quality latex, and that only those capable of producing a first-class standard article would be able to compete.

Small Holders' Advisory Service

The Rubber Research Institute's Small Holders' Advisory Service was started in 1934 when a suitably trained staff from the College (then School) of Agriculture at Serdang became available. This service provides instruction and advice in appropriate methods of tapping, sheet manufacture, bud-grafting, smoke house construction, anti-erosion practices, and treatment of the common pests and diseases. The S.H.A.S. developed steadily up to 1941, when it included 41 instructors and 20 demonstrators. By that time, thanks to its guidance, practically all smallholders in the country had stopped producing slab rubber and were making fair quality sheet, either wet, air dried, or smoked. To aid those who could be persuaded to resort to smoking, a special smoke cabinet was developed suitable for use on the smallest holding.

The Service was interrupted by the war, but now every effort is being made to maintain it and increase its scope. It is hoped that smallholders will take advantage of the lifting of planting restrictions to plant up many young rubber areas; the service will provide for this purpose only the best proved planting material, with due consideration being given to the special needs of smallholders.

The S.H.A.S. is also anxious to encourage establishing cooperative societies among small rubber growers throughout the country, for tremendous improvement in rubber preparation could then be effected with resulting increased profit to smallholders, as the few cooperative centers with smoke houses, already in existence, are proving. It is thought that by cooperation, smallholders might also be able to sell their latex to concerns which export liquid latex.

Capital Increases

Lumut Rubber Estates, Ltd., has issued 274,000 new £1 ordinary shares, thus more than doubling its former capital of £220,000.

Straits Rubber Co., Ltd., intends to acquire the estate, undertaking, and assets of Batan Rahit Rubber Estate, Ltd., and to this end has increased its registered capital of £1,050,000 by issuing an additional 75,000 £1 ordinary shares.

INDO-CHINA

Available figures for production on large estates in Indo-China during the first seven months of 1947 give the total, including sole crepe and latex, as 17,670 metric tons, according to a Washington report. Few small plantations are said to be in operation.

The large estates are producing a steadily increasing quantity of sole crepe; the output, 69 tons in January, 1947, rose month by month to 273 tons in July; the total for the seven months was 1,069 metric tons, Apparently no latex was produced in the first quarter of 1947; in the succeeding four months 62 tons were produced, with July accounting for 44 tons. Exports of rubber during the first nine months of 1947 are put at 37,535 long tons.

From a different source it is learned that Indo-China shipped to France in the first ten months of 1947 at total of 29,983 metric tons.

A press report dated January 4, 1948, states that a fire destroyed 2,000 tons of rubber in a dockside warehouse at Saigon. Sabotage is suspected.

CEYLON

Floor prices on rubber have been removed in Ceylon, and shippers and dealers may now deal freely in sheet rubber; shippers may export to any destination, but they must first obtain a permit from the Rubber Commissioner.

AUSTRALIA

During the three months, July to September, 1947, Australia imported rubber and rubber manufactures to a total value of £1,096,000, against £399,000 in the same period of 1938. Exports for the same three months of 1947 came to £A.172,000, against £A.21,000 in the same period of 1938.

Australia recently joined the International Rubber Study Group, which now includes 13 member governments, but 14 delegations since the United Kingdom is represented by two delegations, one to represent its own interests, and the other those of the colonies.

Vulcanizing Characteristics

(*Continued from page* 751)

above, rubber compounds containing it vulcanize faster than similar mixtures with channel carbon.

(5) The currently suggested compounding approach involves the use of relatively low sulfur with only a modest adjustment of accelerator and the use of retarding softeners. Possibly additional antioxidant may be desirable.

It is hoped that further studies for a subsequent paper will throw more light on certain points which have been referred to in the foregoing and assist in the compounders' future formulation work in connection with ultrafine furnace carbon. The authors thank Binney & Smith Co. for permission to present this paper and desire to express their gratitude for cooperation from associates within their organization and the research department of Columbian Carbon Co.

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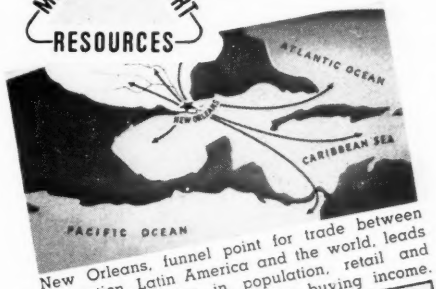

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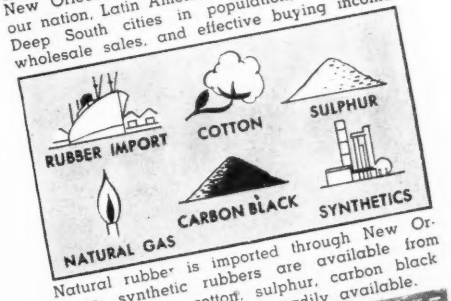
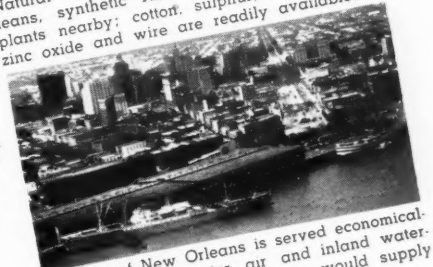


Natural rubber is imported through New Orleans, synthetic rubbers are available from plants nearby; cotton, sulphur, carbon black zinc oxide and wire are readily available.



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Editor's Book Table

BOOK REVIEWS

"Encyclopedia of Chemical Technology." Volume I—A to Anthrimides. Raymond E. Kirk and Donald F. Othmer, Editors. Janet D. Scott and Anthony Standen, Assistant Editors. The Interscience Encyclopedia, Inc., 215 Fourth Ave., New York 3, N. Y. Cloth, 7½ by 10½ inches. 1004 pages. Price $20.

This "Encyclopedia of Chemical Technology" is to be published in ten volumes, each volume ranging between 900 and 1000 pages, with two to three volumes to appear per year. It is the first published encyclopedia of its kind in America giving a complete coverage of chemical technology in this country.

The information in the first volume was prepared by 93 contributors whose selection was based upon their specialization in the various fields covered in the first volume. In addition, the assistance of 41 outstanding men in the field of chemistry was acknowledged by the editors. The type of information presented in this ten-volume work is similar to that to be found in Ullmann's "Enzyklopadie der Technischen Chemie," Thorpe's "Dictionary of Applied Chemistry," and the "Encyclopedia Britannica."

The great value of this publication to American chemists lies in its presentation of chemical technology as practiced in America and presented here in a very concise and well-ordered form so that it can be referred to with a minimum of effort on the part of the reader. Judging from Volume I, the material in this work is thoroughly up-to-date and has been carefully written so that it is readily understood by anyone with a general knowledge in the field of chemistry. Like every publication of this type, there are sections where the basic material presented could be improved upon; however, in general this is not the case.

The editors and publishers of this extensive encyclopedia are to be highly congratulated for their courage in undertaking such an extensive publication. This type of publication has been badly needed for a long time since chemical technology in America has become extremely extensive and very complicated. The literature has become so enormous that it requires much labor to find elsewhere information of the type presented in this encyclopedia. For this reason the reviewer wishes to compliment the editors and collaborators for getting out this encyclopedia. The reviewer, of course, is speaking only for Volume I, which he has under review; however, he has no reason but to expect the following volumes to be of equal merit.

A. R. KEMP

"English-French and French-English Technical Dictionary." Francis Cusset. American edition, published by Chemical Publishing Co., Inc., Brooklyn, N. Y. Cloth, 6¾ by 5 inches, 590 pages.

The compiler of this work, M. Cusset, is a mining engineer employed by an important French iron mine, and his dictionary reflects his experience in his special field. However the working of a large iron mine in this day and age directly and indirectly involves various industrial arts and sciences; consequently the terms and expressions chosen touch several technical fields, with naturally the main emphasis on mining and allied mechanics. Those who have occasion to read French technological literature will therefore find this little work a useful reference book to have on hand, doubly acceptable because of the large clear print which has been used throughout. Various tables for converting English and American weights, measures, pressures, temperatures, currency, etc., into metric equivalents, and *vice versa*, add to its value.

"Synthetic Adhesives." Paul I. Smith. Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. Cloth, 8½ by 5½ inches, 134 pages. Price $3.

This is the domestic edition of a British book published in 1943 and, as such, contains a preponderance of information on British adhesives. As the author states in his preface, the volume is a primer or practical introduction to the subject rather than an exhaustive catalog of industrial adhesives. The practical viewpoint is stressed throughout the book. The properties of the different types of synthetic adhesives are given, together with some data on handling and methods of use, and a discussion of the adhesive's advantages and major applications is included. Preparation of the resins themselves is not discussed, and in many instances the coverage of formulations and methods of handling is inadequate in view of recent developments.

Individual chapters are devoted to dry glue films of the phenol-formaldehyde type; phenol-formaldehyde liquid and solid glues; urea-formaldehyde glues; cellulose adhesives; polyvinyl cements; acrylic resin cements; chlorinated rubber and synthetic rubber cements; miscellaneous adhesives; use of synthetic adhesives in the manufacture of wooden aircraft structures; and general applications of synthetic adhesives in industry. As a practical primer in adhesives for the non-technical reader, the volume fulfills its purpose. For the technical reader, a more comprehensive work that would include adhesives tests and specifications, the theory of adhesive action, and an adequate bibliography would be of greater value.

NEW PUBLICATIONS

"Eagle-Picher Celatom—A Superior Diatomaceous Silica for Use as an Industrial Aid." Eagle-Picher Co., Cincinnati 1, O. 24 pages. This illustrated booklet describes the history of Celatom diatomaceous silica, its characteristics, the company's silica deposits, the mining of Celatom, its processing and control testing, and its many applications, including high temperature insulation, filter aids, paper manufacturing, rubber and plastics compounding, and others.

"Sindar Reporter." January-February, 1948. Sindar Corp., 330 W. 42nd St., New York 18, N. Y. 4 pages. This is the first issue of the company organ. It covers the organization of Sindar by Givaudan-Delawanna, Inc., and the company's services and gives brief, general descriptions of Sindar aromatics, germicides, fungicides, stabilizers preservatives and anti-skinning agents.

Publications of the Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago 80, Ill. **"Masterbatch Addition of Indonex Plasticizers to Natural Rubber Compounds."** Circular No. 13-18, January 2, 1948. 4 pages. The use of Indonex masterbatches is discussed, and a table of vulcanizate properties compares the effect on properties of direct and masterbatch addition of Indonex. Typical formulations for tread stocks are included plus data on properties obtained. **"Indonex Plasticizers with Various Fillers in Reclaim Stocks."** Circular No. 13-19, January 2, 1948. 8 pages. The use of Indonex in various types of reclaimed rubber stocks is described. Tables and graphs show properties obtained by using Indonex with various fillers and reinforcing agents in reclaim stocks. **"Selection of Indonex Plasticizer-Accelerator Combinations."** Circular No. 13-20, January 2, 1948. 9 pages. This bulletin shows the effect of Indonex plasticizers on nine important commercial accelerators in a total of 12 basic natural rubber formulations. Extensive data on properties are set forth for each formulation.

"This is Witco... at Work with Industry." Witco Chemical Co., 295 Madison Ave., New York 17, N. Y. 28 pages. This booklet describes Witco's activities in the chemical field. General descriptions appear of the company's facilities, research work, manufacturing activities, technical service work, and chemical products; while photographs show Witco plants, laboratories, and pilot plant.

"Cumar Resin in a GR-S: Natural Rubber Blend (1:1)." Rubber Laboratory Release No. 8, January, 1948. Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 18 pages. This booklet covers the performance of three grades of Cumar resin in channel black compounds using a blend of equal parts of natural rubber and GR-S. Extensive laboratory test data in the form of tables and diagrams are presented to show that the resins function similarly as effective softeners and extenders and also improve the physical properties of the vulcanizates.

"Nylon Textile Fibers in Industry." E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 32 pages. This booklet enumerates and describes the different industrial applications of nylon textile fiber, including tire cord, aircraft deicers and fuel cells, inflatable boats, garden hose, rubber conveyor belt filling, and others. There is also a section covering the various chemical and physical properties of nylon.

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"Products of the Chemical Division, Koppers Co., Inc." Koppers Co., Inc., Pittsburgh 19, Pa. 4 pages. This bulletin lists some 28 products being made in commercial quantities. The chemical structure of each product is shown together with a description of the material, its reactions, and uses.

Publications of E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. **"Insulation and Jacket Compounds for Wire and Cable."** Report 47-6, October, 1947. R. S. Griffin and J. P. Fuller. 28 pages. This bulletin suggests various neoprene and GR-S formulations for use as insulations and jackets on wire and cable. All the compounds are designed for continuous vulcanization, and many are formulated for high temperature cures. Data on physical properties of the vulcanizates are given, and recommendations are made for compounds to meet A.S.T.M. and Underwriters' Laboratories specifications. **"The Neoprene Notebook**—Neoprene Hose." No. 39, December, 1947. 8 pages. This issue contains information on the use of neoprene hose for aromatic service, neoprene jacketing and insulation for underground cable, neoprene binders for flexible grinding wheels, neoprene vibration absorbing pads, neoprene coated wire rope, and neoprene pipe wipers.

"Link-Belt Series 'D-E' Radial-Thrust, Self-Contained, Preadjusted Roller Bearings." Book No. 2196. Link-Belt Co., 519 N. Holmes Ave., Indianapolis 6, Ind. 16 pages. This illustrated booklet describes the company's "DE" roller bearings and presents information on dimensions, weights, bearing capacities, fit tolerances, and other pertinent data.

"Cyanamid Aero Brand Metallic Soaps." American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. 8 pages. This booklet gives information on specifications and applications of the company's aluminum, magnesium, calcium, and zinc stearates.

"The Estimation of Small Percentages of Rubber in Fibrous Materials." The British Rubber Development Board, Inc., Market Bldg., Mark Lane, London, E.C.3, England. Positex Pamphlet No. 7. 4 pages. **"1947 Supplement to Book of A.S.T.M. Standards Including Tentatives.** Part III-A. Nonmetallic Materials—Fuels, Petroleum, Aromatic Hydrocarbons, Soaps, Water, Textiles." "Part III-B. Nonmetallic Materials—Electrical Insulation, Plastics, Rubber, Paper, Shipping Containers, Adhesives." American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., 448 (A) and 316 (B) pages. **"Planning for Liquidation.** Quarterly progress report to the Congress by the War Assets Administration." Fourth Quarter, 1947. United States Government Printing Office, Washington, D. C. 52 pages. **"List of Inspected Gas, Oil, and Miscellaneous Appliances."** November, 1947. 196 pages. **"Bi-Monthly Supplement to All Lists of Inspected Appliances, Equipment, Materials."** December, 1947. 75 pages. Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, 11, Ill.

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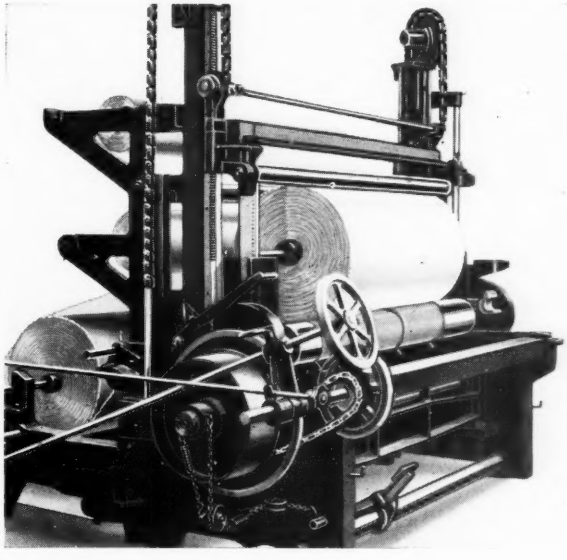

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Markets Reviews

CRUDE RUBBER

Commodity Exchange

WEEK-END CLOSING PRICES

	Dec. 27	Jan. 31	Feb. 7	Feb. 14	Feb. 21	Feb. 28
Feb.	22.35	21.20	20.25	20.25	20.06	....
Mar.	22.24	21.20	20.25	20.25	20.06	19.35
Apr.	21.45	21.15	19.95	20.05	19.80	19.00
May	21.35	21.05	19.52	19.66	19.55	18.70
June	20.95	19.50	19.15	19.15	18.95	18.15
July	20.85	19.40	19.05	19.05	18.85	18.05
Aug.	20.55	19.15	18.65	19.70	18.50	17.75
Sept.	20.45	19.05	18.54	18.60	18.40	17.65
Oct.	20.45	18.80	18.20	18.25	18.10	17.35
Nov.	20.45	18.75	18.15	18.20	18.00	17.25
Dec.	20.45	18.70	18.10	18.15	17.90	17.15
1949						
Jan.-Feb.	20.45	18.70	18.10	18.15	17.90	17.15
Mar.-Apr.	——	18.70	18.10	18.15	17.90	17.15

THE crude rubber futures market on the Commodity Exchange during February could best be characterized as irregular, with prices moving moderately downward. Despite the break in other commodity markets, rubber futures remained relatively firm in tone and reflected the firmness of the London and the Singapore markets, which were buoyed up by a strong and consistent demand from the Continent. Another optimistic factor was the expectation of renewed volume buying by major consumers; this buying, however, did not materialize during the month.

Some of the recent trade buying on the Exchange was attributed to the generally lower price level being maintained in New York, in comparison with London and Singapore prices, which has encouraged dealers to secure desired stocks through the futures market. The market apparently ignored the Congressional action on new rubber legislation which would, in effect, require a lower level of synthetic rubber consumption than is now being maintained. The immediate effects of such legislation are being discounted in the markets because the desired ratio of synthetic to total rubber under present legislation is being maintained by voluntary rather than "enforced" consumption of synthetic rubber.

Total volume of sales on the Exchange during February was 31,380 tons, as compared with 32,510 tons during January.

April futures opened the month at 20.50¢, fell slightly, hovered between 19.15¢ and 20.35¢, and closed the month at 19.00¢.

In Netherlands India, it is reported that prospects are good for the evacuation of Republican troops from the "Van Mook Line" in Java within the near future. If this movement is carried out, large territories in both eastern and western Java containing many rubber estates will once again become workable. Although the rate of progress is still difficult to assess, some increase in the production of rubber in these areas seems likely during the course of this year.

Brazil's rubber industry, which has been endeavoring to make a comeback, is facing another crisis. The law passed by the Brazilian Government last September to aid the rubber industry provided for 100% financing of rubber extraction, with 60% supplied by the Rubber Credit Bank and 40% by the federal treasury, gave the Bank a rubber monopoly, and established a price of 90¢ per kilogram for crude rubber for five years. The government has not as yet supplied its 40% financing, and the Bank refuses to finance more than 60%. Shipments of crude rubber are piling up in Manaos and Belem, and it is feared that the crop now under way will show a great reduction unless the federal money is forthcoming quickly.

Fixed Government Prices*

Guayule

Guayule *(carload lots)*	$0.17½

Latex†

Hevea, normal *(tank car lots)*	.30¾
Centrifuged *(tank car lots)*	.32½
GR-S, Type 2 *(tank car lots)*	.18½‡
(Carload, drums)	.268
(Less carload, drums)	.273
Types 3 and 4 *(tank car lots)*	.18½‡
(Carload, drums)	.26
(Less carload, drums)	.26½
Type 5 *(tank car lots)*	.20¼‡
(Carload, drums)	.27¾
(Less carload, drums)	.27¾

Plantation Grades

No. 1X Ribbed Smoked Sheets	.23
1X Thick Pale Latex Crepe	.29
1 Thick Pale Latex Crepe	.29
2 Thick Pale Latex Crepe	.28½
3 Thick Pale Latex Crepe	.28¼
1X Thin Pale Latex Crepe	.29
1 Thin Pale Latex Crepe	.29
2 Thin Pale Latex Crepe	.28½
3 Thin Pale Latex Crepe	.28¼
Liberian A	.28⅝
AA	.29
RCMA Watermarked Crepe No. 16	.3578
17	.3238
18	.3078
Sole Crepe Trimmings	.28½
No. 1X Thin Pale Latex Crepe Trimmings	.28½
1X Brown Crepe	.2178
2X Brown Crepe	.2158
2 Remilled Blankets (Amber)	.2134
3 Remilled Blankets (Amber)	.2158
Rolled Brown	.185

Synthetic Rubber

GR-M (Neoprene GN)	.27½
GR-S (Buna S)	.18½
GR-I (Butyl)	.18½

Wild Rubber

Upriver Coarse (crude)	.1258
(Washed and dried)	.2013
Islands Fine (crude)	.1458
Washed and dried)	.2212
Caucho Ball (crude)	.1158
(Washed and dried)	.1912
Mangabiera (crude)	.0812
(Washed and dried)	.18

* For a complete list of all grades of dry rubbers see Rubber Reserve Co. General Sales and Distribution Circular, July 1, 1945, as amended.
† Prices per pound total solids.
‡ Plus average freight charge of 0.75¢ per pound dry weight.

New York Outside Market

WEEK-END CLOSING PRICES

	Dec. 27	Jan. 31	Feb. 7	Feb. 14	Feb. 21	Feb. 28
No. 1 Ribbed Smoked Sheets:						
Feb.	22.63	21.25	20.50	20.50	20.50	19.75
Mar.	22.63	21.25	20.50	20.50	20.50	19.75
Apr.-June	21.63	20.13	19.88	20.00	19.75	19.13
July-Sept.	21.25	19.50	19.25	19.50	19.13	18.25
No. 3 Ribbed Smoked Sheets	22.50	20.63	19.88	19.88	19.88	19.00
No. 2 Amber	17.25	17.00	16.75	16.50	16.75	15.88
Flat Bark	14.25	13.50	13.00	13.13	13.25	12.50

TRADING was quiet on the New York Outside Market last month. Prices declined somewhat and fluctuated irregularly within a relatively narrow range. The spot price for No. 1 Ribbed Smoked Sheets was 21.25¢ on February 2, fell below the 21.00¢ level on February 5, fluctuated between 20.25¢ and 20.63¢ for the balance of the month, and closed the month at 19.75¢.

The market was supported by the firmness of the London and Singapore primary markets because factory interest was negligible throughout the month. The anticipated large increase in buying of major consumers did not occur, although dealers expressed the opinion that this pick-up would be tempered by the reduced level of the production. Some observers stated their belief that the large factories have sufficient stocks of crude rubber on hand to carry them through April, especially at reduced production rates.

Although there have been no reports recently of government purchasing, a resumption of stockpile buying is expected in the near future. The steady tone of primary markets in recent months, the continuing large purchases reported being made by Russia, and what is characterized as growing military pressure in Washington for building up adequate stockpiles of strategic materials are the primary factors assumed to be laying the basis for a quick reentry of the government into the market.

Latices

THE historical cyclic record of "famine or feast" in liquid latex supply has again repeated itself, according to Arthur Nolan, Latex Distributors, Inc., writing in Lockwood's February *Rubber Report*. Supply was insufficient not too long ago, but now production of latex has outstripped consumption so that there are now more than ample production facilities to care for current consumption rates. In fact, consumption has so lagged that some production facilities are now worked at only a fraction of their capacities. This delay in higher consumption has also caused the indefinite postponing of certain plans for additional new supplies. Latex supplies in 1948 from Malaya, Ceylon, Netherlands India, and Liberia are estimated at 63,000 long tons, dry weight, but it is thought that some producers will reduce their output unless consumption markedly increases.

Mr. Nolan gives total 1947 imports and consumption of *Hevea* latex as 17,675 and 13,917 long tons, dry weight, respectively. December imports were 2,279 long tons; consumption, 1,816 long tons; and end-of-month stocks, 4,946. Total 1947 production of GR-S latex is given at 22,330 long tons, and December production at 2,044 long tons. Production of neoprene latex during December was 371 long tons, and 406 long tons were produced during January. No changes in latex prices are shown from those given in our previous market review.

Hevea latex consumption showed only a small increase instead of the increase expected when regulations on foam composition were relaxed. However increases in *Hevea* latex usage will most likely result from its wider use in foam since the next largest usage is in tires, where its current high prices retards its wider application.

The British, Dutch, and French are aware of the need of greater usage of latex and are at work on this problem. Particularly interesting developments there have included latex bicycle tires and molded shoe soles. Latex consumption in the United Kingdom and Europe is still small and totaled only 8,500 long tons in 1947. There is expectation, however, of substantial increases in such consumption as the monthly rate of consumption has recently increased, Mr. Nolan said.

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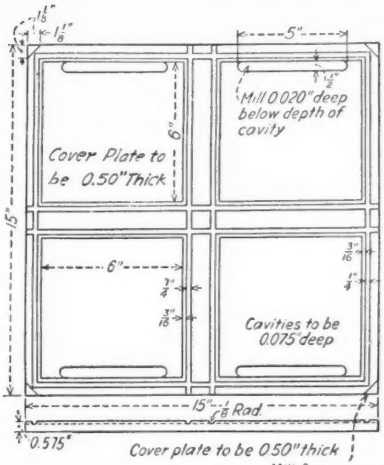

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The rapidly developing field of plastic latices is receiving widespread attention. Besides their more or less standard uses as in adhesives, films, etc., their possible use as reinforcers for natural and synthetic rubber latices is being studied. Costs of plastic latices range from 30¢ to $1.00 a pound, dry weight, with most types within the 40-60¢ range, and possibilities are good for decreases in prices with increasing usage. There are already capacities available and in regular use to produce more than 2,500,000 dry pounds a month of these materials, and production could be further augmented by utilizing GR-S latex facilities which are now either inactive or being only partially used.

RECLAIMED RUBBER

ALTHOUGH sales of reclaimed rubber in February fell back from the January levels to figures approximating those of December, basic market undertones remained unchanged. The reclaim industry is riding a wave of optimism, with production, sales, and exports all at high levels and no changes foreseen for at least the next few months.

Final November and preliminary December statistics on the reclaimed rubber industry are now available. Production of reclaim during November totaled 23,161 long tons; consumption, 23,491 long tons; exports, 1,339 long tons; and month-end stocks, 36,425 long tons. For December, preliminary statistics show a production of 25,075 long tons; consumption, 25,504 long tons; exports, 1,437 long tons; and end-of-month stocks, 36,081 long tons.

No changes occurred in reclaimed rubber prices last month, and current prices follow.

Reclaimed Rubber Prices

	Sp. Gr.	¢ per Lb.
Whole tire	1.18-1.20	8 / 8.5
Peel	1.18-1.20	9 / 9.5
Inner tube		
Black	1.20-1.22	12.75/13.25
Red	1.20-1.22	13.5 /14
GR-S	1.18-1.20	9.5 /10
Butyl	1.16-1.18	8.5 / 9
Shoe	1.50-1.52	8.25/ 8.75

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

SCRAP RUBBER

THE scrap rubber market continued to present a fairly steady position during February, although dealers reported a certain spotty falling off in demand. Tire shipments were being made, but some consumers have displayed a reluctance to take on any additional supplies of tires at present. The market for tubes was somewhat easier, and black passenger tube prices dropped from 5.25¢ to 5.00¢ a pound, although other tube prices remained unchanged. Reflecting the reduced demand for tires, the price for mixed auto tires delivered Akron fell from $14.50 to $14.00 per net ton. It is said that mills specifying segregated tires have paid a premium of $2 above the quoted rate for such tires. Despite currency difficulties and trade restrictions, tubes were reported to be moving to foreign destinations at very firm prices. Of importance to dealers who import from Canada scrap containing some synthetic, a bill to permit duty-free importation of synthetic rubber scrap was passed by Congress on February 16 and then it was sent to the President for approval.

Following are dealers' buying prices for scrap rubber in carload lots delivered to mills at points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$13.00	$14.00
S.A.G. passenger (natural)	nom.	nom.
Truck (natural)	nom.	nom.
Peelings (natural), No. 1	50.00	50.00
No. 2	31.00	31.00
No. 3	29.00	29.00
	(¢ per Lb.)	
Mixed auto tubes	4.25	4.25
Red passenger tubes	7.00	7.00
Black passenger tubes	5.00	5.00
Truck tubes	5.00	5.00
Mixed puncture-proof tubes	0.50	0.50
Air brake hose	nom.	nom.

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE
WEEK-END CLOSING PRICES

Futures	Dec. 27	Jan. 31	Feb. 7	Feb. 14	Feb. 21	Feb. 28
Apr.	35.65	34.78	33.92	31.95	32.16	32.92
June	34.98	34.50	33.68	31.74	31.95	32.61
Aug.	33.45	33.31	32.67	30.82	30.86	31.43
Oct.	31.52	31.53	31.20	29.60	29.36	29.73
Dec. 1949	30.91	31.22	30.93	29.31	29.08	29.32
Mar.	30.65	31.09	30.76	29.16	28.86	29.11

THE cotton market was quiet and erratic in tone the first week in February as prices moved irregularly downward because of liquidation and hedging. On February 10 the market broke, following the break in other commodities, and widespread liquidation depressed prices to the limit, particularly on nearby positions. After a few nervous trading days the market rallied on February 14 with professional short covering leading the way. For the balance of the month, trading was thin and the market quiet in a general atmosphere of uncertainty. Mills continued to take cotton on the downside only, and some observers contend that mills have secured enough cotton during February to last them until the new crop is available. The 15/16-inch middling spot price was 35.50¢ on February 2, moved downward slowly, broke on February 10 from 34.87¢ to 32.90¢, hit 32.38¢ on February 13, recovered and hovered around 33.00¢, and closed the month at 33.80¢. May futures prices followed along, starting the month at 34.73¢, hitting a low of 31.54¢ on February 13, and closing the month at 32.93¢.

Traders expressed the belief that the break in cotton was probably over for the time being, but the lack of confidence in other commodity markets and their general uncertain positions might easily cause a renewal of the sell-off. Optimism for the near future centered in prospects for Congressional approval of the European Recovery Plan by April 1, press reports that Germany and Poland were in the market for 25,000 bales of cotton, and reports of Senatorial backing for a plan allowing Japan to buy 750,000 bales of cotton during the current year.

Fabrics

The gray goods market was relatively quiet during February as trade factors eyed the primary market and waited for further developments. Sales of wide industrial goods were at high levels, although some slowdown in interest occurred during the third week of the month, following the slump in sales of narrow gray cloths. Most mills were sold up to a large extent through June, although there were still goods to be had for April and May in some types of fabrics, notably the chafers and hose and belt constructions used by the rubber industry.

Ducks continued to move in a fairly steady volume with quotations for all numbered ducks continuing at 39% off the list price; while hose and belting ducks were quoted generally at 68.5¢ a pound. Sheeting prices softened toward the end of the month because of a drop in print cloth prices, the protracted withdrawal of bag buyers from the sheeting market, and a belief that the decline in raw cotton and other commodities would be reflected in sheeting demand. Osnaburgs continued in slack demand with a few transactions made. Drills and twills showed good activity with some inquiries being received for third-quarter deliveries.

RAYON

THE domestic rayon industry continued its record-breaking course during 1947 with a total production of 975,100,000 pounds, exceeding the previous record set in 1946 by 14%. Of this total output, 746,700,000 pounds were filament yarn and 228,400,000 pounds were staple; these levels were 10% and 30%, respectively, above 1946 totals. Each division of the industry attained new production peaks last year, with the largest poundage increase achieved in viscose staple.

The 1947 production of viscose plus cupra yarn was higher in all denier categories except for the 125, 525 to 999, and 1100 denier yarns. Production of the high-tenacity 1100 denier and coarser viscose yarns, used by tire manufacturers, was 6% greater than in 1946. Total yarn of all types shipped to tire manufacturers during 1947 was 227,500,000 pounds, having an average denier of 1372. Rayon filament yarn shipments also set a new record of 729,000,000 pounds, surpassing 1946 shipments by 9.5%.

Accounting Manual Supplement

THE publication of a supplement to the SPI accounting manual was recently announced by William T. Cruse, executive vice president of the Society of the Plastics Industry, Inc. The original manual was published in 1946, but the work has been carried on by a 52-man committee under the chairmanship of William H. Nussbaum, of Columbia Protektosite Co. The new supplement is being sent to SPI members. Copies are available from the Society's central office, 295 Madison Ave., New York 17, N. Y., at a price of $2.50 to members and $5 to non-members.

MARBON 'S' and 'S-1'

SYNTHETIC RESINS

USE WITH SYNTHETIC RUBBERS

FOR NONMARKING SOLES, HEELS AND TOPLIFTS
TO OBTAIN

★ EXCELLENT ABRASION RESISTANCE

★ SUPERIOR TEAR RESISTANCE

★ HARDNESS AND STIFFNESS

FOR DETAILS AND SAMPLES
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Plantation and Wild Rubbers
Synthetic Rubbers
Liquid Latex
Balatas, Guayule, Gums

★

Distributor of
GR-S Synthetic Latices
By Appointment of Office of Rubber Reserve

BRANCHES AND SALES REPRESENTATIVES
Charles T. Wilson Co., Inc., United Bldg., Akron, Ohio
Ernest Jacoby & Co., 79 Milk St., Boston, Mass.
Reinke & Amende, Inc., 1925 East Olympic Blvd., Los Angeles, Cal.
Charles T. Wilson Company (Canada) Ltd., 406 Royal Bank Building, Toronto, Canada

Regular and Special Constructions of

COTTON FABRICS

Single Filling Double Filling
and

ARMY
Ducks

HOSE and BELTING
Ducks

Drills

Selected
Osnaburgs

Curran & Barry

320 BROADWAY
NEW YORK

COMPOUNDING INGREDIENTS

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.03⅜ / $0.06
Rottenstone, domestic	ton	36.00 / 43.00

Accelerators, Organic

A-10	lb.	.40 / .47
A-19	lb.	.52 / .58
A-32	lb.	.59 / .69
A-77	lb.	.42 / .55
A-100	lb.	.42 / .55
Accelerator 8	lb.	**.75**
49	lb.	.40 / .42
552	lb.	1.63
808	lb.	.59 / .61
833	lb.	1.13 / 1.15
Acrin	lb.	.65
Advan	lb.	.55
Aero AC 50	lb.	.46 / .52
Altax	lb.	**.35** / .445
Antox	lb.	.54 / .56
Arazate	lb.	2.16
Beutene	lb.	.59 / .64
B-I-F	lb.	.27 / .32
Butasan	lb.	1.10
Butazate	lb.	1.00
Butyl Eight	lb.	1.00 / 1.05
Zimate	lb.	1.00
Captax	lb.	.27 / **.345**
C-P-B	lb.	1.95
Cumate	lb.	1.45
Cuprax	lb.	.60 / .62
Diesterex N	lb.	.50 / .57
DOTG (diorthotolylguanidine)	lb.	.44 / .50
DPG (diphenylguanidine)	lb.	**.39** / **.45**
El-Sixty	lb.	.39 / .46
Ethasan	lb.	1.10
Ethazate	lb.	1.00
Ethyl Thiurad	lb.	1.25
Tuads	lb.	1.00
Tuex	lb.	1.00
Zimate	lb.	1.00
Ethylidene Aniline	lb.	.42 / .43
Formaniline	lb.	.36 / .37
Good-Rite Erie	lb.	.60 / .62
Hepteen	lb.	.42 / .48
Base	lb.	1.80 / 1.90
Ledate	lb.	1.00
M-B-T	lb.	**.27** / **.33**
M-B-T-S	lb.	**.35** / **.41**
Methasan	lb.	1.20
Methazate	lb.	1.00
Methyl Selenac	lb.	1.60
Tuads	lb.	1.10
Zimate	lb.	1.00
Monex	lb.	1.10
Mono-Thiurad	lb.	1.25
Morfex 33	lb.	.53 / .58
O-X-A-F	lb.	.34 / .39
Pentex	lb.	.74 / .84
Flour	lb.	.1225/ .1325
Permalux	lb.	1.18 / 1.20
Phenex	lb.	.49 / .54
Pipazate	lb.	1.53
Polyac	lb.	**1.40**
Rotax	lb.	.39 / .42
S. A. 52	lb.	1.10
57, 62, 67, 77	lb.	1.00
66	lb.	1.45
Satex	lb.	1.15
Santocure	lb.	.53 / .60
Selazate	lb.	1.45
Selenac	lb.	1.45
SPDX-G	lb.	.53 / .58
Tellurace	lb.	1.45
Tetrone	lb.	1.25
A	lb.	1.85
Thiocarbanilide	lb.	.34 / .36
Thiofide	lb.	**.35** / **.42**
Thionex	lb.	1.10
Thioxax	lb.	.27 / **.34**
Thiurad	lb.	1.25
Thiuram E	lb.	1.00
M	lb.	**1.10**
Trimene	lb.	.54 / .64
Base	lb.	1.03 / 1.18
Triphenylguanidine (TPG)	lb.	.45 / .50
Tuex	lb.	1.10
2-MT	lb.	.58 / .60
Ulto	lb.	.99 / 1.04
L	lb.	1.04
Ureka	lb.	.55 / .62
Blend B	lb.	.55 / .62
C	lb.	.52 / .59
Vulcanex	lb.	**.45**
Z-B-X	lb.	2.45
Zenite	lb.	.33 / .35
A	lb.	.42 / .44
B	lb.	.39 / .41
Special	lb.	.34 / .36

Accelerator-Activators, Inorganic

Lime, hydrated	ton	9.00 / 12.25
Litharge, commercial	lb.	$0.166 / $0.176
Eagle, sublimed	lb.	.17 / .176
FBS	lb.	.17 / .176
Red lead, commercial	lb.	.17 / .19
Eagle	lb.	.18 / .186
#2 RM	lb.	.18 / .186
White lead, basic	lb.	.16 / .175
Eagle	lb.	.16 / .165
National	lb.	.16 / .175
Silicate	lb.	.16 / .175
Eagle	lb.	.1685
Zinc oxide, commercial†	lb.	.10 / .12½

Accelerator-Activators, Organic

Activex	lb.	.20 / .22
Barak	lb.	**.60**
Bunac K-17	lb.	.17 / .19
D-B-A	lb.	1.95
Delac P	lb.	.45 / .52
Double distilled cottonseed fatty acids	lb.	.1175/ .14
Emery's 0-18 Elaine	lb.	**.255** / **.375**
S-24	lb.	**.34** / **.43**
Guantal	lb.	.43 / .50
Laurex	lb.	.33 / .35
Lead oleate	lb.	.2625
MODX	lb.	.295 / .345
Neo-Fat H.F.O.	lb.	.21 / .22
1-60	lb.	.20 / .21
1-65	lb.	.24 / .25
Palmalene	lb.	.15
Plastone	lb.	.27 / .30
Ridacto	lb.	.22 / .24
Stearex Beads	lb.	.147⅛/ .157⅛
Stearic acid, single pressed	lb.	.335 / .345
Double pressed	lb.	.34 / .35
Triple pressed	lb.	.3625/ .3725
Stearite	lb.	.147⅛
Tonox	lb.	.50 / .59
Zinc stearate	lb.	.41 / .42

Alkalies

Caustic soda, flake	100 lbs.	3.25 / 5.70
Liquid, approx. 50%		
	100 lbs.	2.15 / 2.35
Solid	100 lbs.	2.85 / 5.30

Antioxidants

AgeRite Alba	lb.	2.20 / 2.30
Gel	lb.	.55 / .57
H.P.	lb.	.58 / .60
Hipar	lb.	**.76** / **.78**
Powder	lb.	.43 / .45
Resin	lb.	.60 / .62
D	lb.	.43 / .45
Stalite	lb.	.43 / .45
White	lb.	1.35 / 1.45
Akroflex C	lb.	**.58** / .60
Albasan	lb.	.69 / .74
Aminox	lb.	.43 / .52
Antisol	lb.	**.23** / .24
Antox	lb.	.54 / .56
Aranox	lb.	2.15
Betanox Special	lb.	.61 / .70
B-L-E	lb.	.43 / .52
Powder	lb.	.61 / .70
B-X-A	lb.	.43 / .52
Copper Inhibiter X-872-A	lb.	**1.50**
Flectol H	lb.	.43 / .50
Flexamine	lb.	.58 / .67
Heliozone	lb.	.25 / .26
Mekon micro-crystalline wax, amber	lb.	.14 / .16
Black	lb.	.135 / .155
Yellow	lb.	.155 / .175
Neozone (standard)	lb.	.66 / .68
A	lb.	.43 / .45
C	lb.	.47 / .49
D	lb.	.43 / .45
Distilled	lb.	.48 / .50
Parazone	lb.	.68
Perflectol	lb.	.58 / .65
Permalux	lb.	**1.53** / **1.55**
Rio Resin	lb.	.48 / .50
Santoflex B	lb.	.43 / .50
BX	lb.	.57 / .64
Santovar-A	lb.	1.30 / 1.37
Santowhite	lb.	1.40 / 1.52
S.C.R.	lb.	.32 / .34
Solux	lb.	1.93 / 1.95
Stabilite	lb.	.48 / .50
Alba	lb.	.69 / .74
L	lb.	.48 / .50
Sunproof	lb.	.25 / .30
Improved	lb.	.25 / .30
Jr.	lb.	.18 / .23
Thermoflex	lb.	**1.48** / **1.50**
A	lb.	.76 / .78
C	lb.	.54 / .56
Tonox	lb.	.50 / .59
Tysonite	lb.	.215 / .2225
V-G-B	lb.	.43 / .52
Zenite	lb.	.37 / .39

Antiseptics

Copper naphthenate, 6-8%	lb.	.21
G-4	lb.	.95 / 1.40
G-11	lb.	4.50 / 4.75
Pentachlorophenol	lb.	.20 / .25
Resorcinol, technical	lb.	.68
Zinc naphthenate, 8-10%	lb.	**.1975**/ .24

Blowing Agents

Ammonium bicarbonate	lb.	$0.064 / $0.0975
Carbonate	lb.	.11 / .1225
Sodium bicarbonate	100 lbs.	1.85 / 2.35
Carbonate, technical	100 lbs.	1.08 / 4.13
Sponge Paste	lb.	.20
Unicel	lb.	.60
ND	lb.	**1.00**

Bonding Agents

MDI	lb.	7.25 / 7.75
50	lb.	3.60 / 3.85
Ty-Ply Q. S.	gal.	6.75 / 8.00

Brake Lining Saturants

B.R.T. No. 3	lb.	.0175/ .0185
Resinex L-5	lb.	.0175/ .025

Carbon Blacks

Conductive Channel—CC

Continental R-20	lb.	.055 / .102
R-40	lb.	.055 / .102
Spheron C	lb.	.08 / .125
I	lb.	.066 / .111
N	lb.	.185 / .25
Voltex	lb.	.15 / .185

Easy Processing Channel—EPC

Continental AA	lb.	.055 / .102
Kosmobile 77/Dixiedensed 77	lb.	.055 / .102
Micronex W-6	lb.	.055 / .097
Spheron #9	lb.	.06 / .102
Witco #12	lb.	.055 / .102
Wyex	lb.	.065

Hard Processing Channel—HPC

Continental F	lb.	.055 / .102
HX	lb.	.065
Kosmobile S/Dixiedensed S	lb.	.055 / .102
Micronex Mark II	lb.	.055 / .097
Spheron #4	lb.	.06 / .102
Witco #6	lb.	.055 / .102

Medium Processing Channel—MPC

Arrow TX	lb.	.065 /
Continental A	lb.	.055 / .102
Kosmobile S-66/Dixiedensed S-66	lb.	.055 / .102
Micronex Standard	lb.	.055 / .097
Spheron #6	lb.	.06 / .102
Witco #1	lb.	.055 / .102

Conductive Furnace—CF

Statex A	lb.	.08 / .10
Sterling I	lb.	.09

Fine Furnace—FF

Statex B	lb.	.0525/ .09
Sterling 99	lb.	.10

High Abrasion Furnace—HAF

Philblack O	lb.	.07

High Elongation Furnace—HEF

Sterling K	lb.	.05 / .09

High Modulus Furnace—HMF

Continex HMF	lb.	.05 / .075
Kosmos 40/Dixie 40	lb.	.05 / .075
Modulex	lb.	.05 / .075
Philblack A	lb.	.05 / .06
Statex 93	lb.	.05 / .075
Sterling L	lb.	.05 / .09

Semi-Reinforcing Furnace—SRF

Continex SRF	lb.	.035 / .055
Essex	lb.	.035 / .055
Furnex	lb.	.035 / .06
Gastex	lb.	.035 / .075
Kosmos 20/Dixie 20	lb.	.035 / .055
Pelletex	lb.	.035 / .075
Sterling R, S	lb.	.035 / .075

Fine Thermal—FT

P-33	lb.	.05

Medium Thermal—MT

Thermax	lb.	.03

Chemical Stabilizers

Dutch Boy DS-207	lb.	.525
Plumb-O-Sil	lb.	.26
Tribase	lb.	.2225
Lead stearate	lb.	.48 / .50
Vanstay	lb.	.38 / .40
White lead, basic	lb.	.1575/ .175

Colors

Black

Lampblack, commercial	lb.	.07 / .30

Blue

Du Pont	lb.	**.945** / **3.95**
Stan-Tone	lb.	1.40 / 4.40
Toners	lb.	.30 / 3.50

Brown

Mapico	lb.	.1135

Green

Chrome	lb.	.125 / .4275
Oxide	lb.	.32 / .35
Du Pont	lb.	**1.10** / **3.20**
Guignet's	lb.	.70
Stan-Tone	lb.	1.60 / 3.60
Toners	lb.	.35 / **4.00**

Orange

Du Pont	lb.	2.75 / 3.65
Stan-Tone	lb.	2.20
Toners	lb.	.30 / **1.50**

Red

Antimony oxide	lb.	.275 / .33
R. M. P. No. 3	lb.	.48
Sulfur free	lb.	.52
Cadmium red lithopone	lb.	1.10 / 1.35

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed; contact suppliers for spot prices.

†For trade names, see Color—White, Zinc Oxide.

Porcelain Glove Forms

—for dipped rubber gloves, including linemen's or electricians' gloves and surgeons' gloves. Some are made from our own stock molds and others from customers' molds.

Write today for our new catalog covering rubber glove and other forms for dipped rubber goods. Prompt attention given to requests for quotations based on your specifications or stock items.

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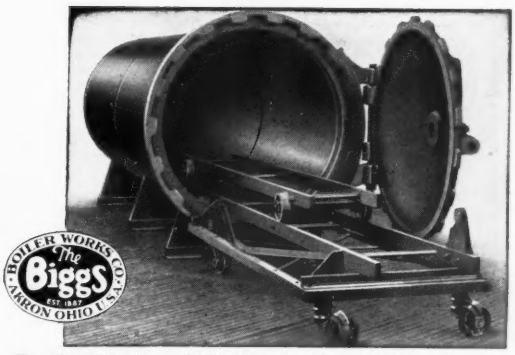

Fig. 18. Vulcanizer with inside car and outside transfer truck. Built to meet customers' requirements; all sizes.

BIGGS Vulcanizers are Standard Equipment in the Rubber Industry

Biggs-built vulcanizers and devulcanizers have always had a prominent place in the development of the rubber industry. For over 45 years Biggs has furnished single-shell and jacketed vulcanizers both vertical and horizontal, as well as many different types of devulcanizers. Biggs modern all-welded units with quick-opening doors are available in all sizes and for various working pressures—with many special features.

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1007 BANK STREET • AKRON 5, OHIO, U.S.A.

READY TO SERVE
OUR OLD FRIENDS
AND NEW IN THEIR

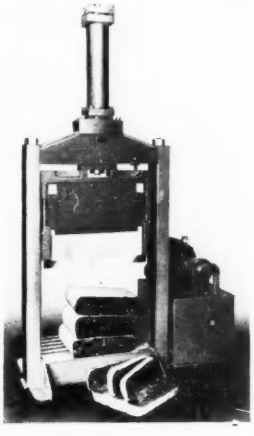
CRUDE RUBBER
REQUIREMENTS

ESTABLISHED 1903

BAIRD RUBBER
AND TRADING COMPANY

233 Broadway, New York, N. Y.
WOrth 4-1460

CRUDE RUBBER BALE CUTTER



Complete Unit

Fully Assembled

Hydraulic Operation

High Production

•

An efficient machine of simple design for cutting bales of crude, synthetic and reclaimed rubber or similar materials. Cuts without aid of water or other lubricant. One man operation—safety control.

•

SPADONE MACHINE COMPANY

10 EAST 43rd St. New York 17, N. Y.

Cadmium red lithophone	lb.	$1.10 / $1.35
Du Pont	lb.	1.15 / 1.90
Iron oxide	lb.	.105
Mapico	lb.	.0885 / .096
Rub-Er-Red	lb.	.0975
Stan-Tone	lb.	1.10 / 2.20
Toners	lb.	.25 / 4.15
White		
Lithopone, titanated		
Cryptone LT	lb.	.0725 / .0825
Titanium pigments		
Rayox LW	lb.	.175 / .185
R-110	lb.	.195 / .205
Ti-Cal	lb.	.0675
Ti-Pure	lb.	.175 / .195
Titanox-A series	lb.	.175 / .185
Titanox-AA	lb.	.175 / .185
B-30	lb.	.075 / .08
C	lb.	.0675 / .0725
RA, RA-10	lb.	.195 / .205
RC types	lb.	.0675 / .0725
Zopaque	lb.	.145
Zinc oxide, commercial	lb.	.10 / 12%
Azo ZZZ-11-44,-55	lb.	.10 / .1025
-66	lb.	.1225 / .125
35% leaded	lb.	.1175 / .12
Eagle AAA, lead free	lb.	.10 / .1025
35% leaded	lb.	.1175 / .12
50% leaded	lb.	.1225 / 12%
Florence Green Seal 8	lb.	.1325 / .135
Red Seal-9	lb.	.1275 / .13
White Seal-7	lb.	.1375 / .14
Horsehead XX-4, -78, -166	lb.	.095 / .0975
Kadox-15, -17, -72	lb.	.095 / .0975
-25	lb.	.1175 / .12
St. Joe, lead free	lb.	.09 / .0925
Zinc sulfide, commercial	lb.	.105 / .1125
Cryptone ZS 800	lb.	.10 / .1025
Yellow		
Cadmolith	lb.	.75 / .85
Chrome	lb.	.27 / .29
Du Pont	lb.	1.35 / 1.95
Mapico	lb.	.0685 / .071
Stan-Tone	lb.	1.20 / 1.75
Toners	lb.	.50 / 1.37
Yellow cadmium lithopone	lb.	.85 / .86
Iron oxide	lb.	.04
Dispersing Agents		
Darvan Nos. 1, 2	lb.	.19 / .30
Stan-Chem	lb.	.1225 / .2587
Triton R-100	lb.	.12 / .25
Dusting Agents		
Glycerized Liquid Lubricant, concentrated	gal.	1.50
Lubrex	lb.	.25 / .30
Mica	lb.	.0675 / .0775
Pyrax A	ton	12.50
W. A.	ton	14.00
Vanfre	gal.	2.00 / 2.50
Zinc stearate	lb.	.41 / .42
Extenders		
Advagum 1098	lb.	.42
1198	lb.	.40
B.R.S. 700	lb.	.0175 / .026
B. R. T. No. 7	lb.	.0265 / .0275
Dielex B	lb.	.06
Extender 15	lb.	.32
600	lb.	.208
Factice		
Amberex Type B	lb.	.416
Brown	lb.	.13 / .35
Neophax A	lb.	.252
White	lb.	.16 / .37
Insulac W	lb.	.055 / .06
Mineral Rubbers		
Black Diamond	ton	25.00 / 30.00
Extender 600	lb.	.1643
Hard hydrocarbon	ton	42.00 / 44.00
No. 38	ton	25.00
Parmr	ton	21.00 / 29.00
Multi Plast	lb.	.0425 / .0475
Naftolen HV	lb.	.11 / .12
LV, MV	lb.	.0525 / .0575
R-100	lb.	.11 / .12
Nuba Nos. 1, 2	lb.	.029
No. 3X	lb.	.0425
Rubber Substitutes,		
Black	lb.	.09 / .15
Brown	lb.	.105 / .1875
White	lb.	.0975 / .165
Synthetic 100	lb.	.41
Vinosol Resin	lb.	.025 / .035
Vistanex	lb.	.32 / .36
Fillers, Inert		
Asbestos fiber	ton	26.50 / 73.00
Barytes, floated white	ton	33.30 / 45.00
Off-color, domestic	ton	19.00 / 20.00
Blanc fixe, dry, precip	ton	65.00 / 85.00
Clays		
Champion	ton	13.00
Crown	ton	11.00 / 23.00
McNamee	ton	12.50
Stellar-R	ton	50.00
Flocks		
Cotton, dark	lb.	.095 / .112
Dyed	lb.	.45 / .85
White	lb.	.12 / .20
Fabrifil X-24-G	lb.	.095
X-24-W	lb.	.135
Filfloc 6000	lb.	.16
F-40-9000	lb.	.105
Kalite	ton	26.00
Lead sulfate, basic	lb.	$0.1525 / $0.155
Lithopone, commercial	lb.	.06 / .065
Albalith	lb.	.055 / .0575
Astrolith	lb.	.055 / .057½
Eagle	lb.	.0725 / .075
Sunolith	lb.	.055 / .057½
Mica	lb.	.0675 / .0775
Pyrax A	ton	12.50
W. A.	ton	14.00
Ti-Cal	lb.	.0675
Silical	ton	7.00 / 55.00
Titanox-C, RCHT	lb.	.055 / .0575
White lead, sublimed	lb.	.085 / .09
Eagle	lb.	.085 / .0875
Whiting, limestone	ton	10.00 / 28.00
Witco	ton	6.50
Finishes		
Black-Out	gal.	4.50 / 8.00
Flocks		
Cotton, dark	lb.	.095 / .112
Dyed	lb.	.45 / .85
White	lb.	.12 / .20
Rayon, colored	lb.	.90 / 1.50
White	lb.	.75 / 1.25
Rubber lacquer, clear	gal.	1.00 / 2.00
Colored	gal.	2.00 / 3.50
Shoe varnish	gal.	1.45
Talc	ton	21.00 / 25.00
Wax, Bees	lb.	.51 / .70
Carnauba	lb.	.75 / 1.44
Montan	lb.	.57
No. 118, colors	gal.	.86 / 1.41
Neutral	gal.	.76 / 1.31
Van Wax	gal.	1.25 / 1.30
Latex Compounding Ingredients		
Accelerator 89	lb.	1.20
122	lb.	1.30
Advawet 10	lb.	.46
Aerosol	lb.	.35
Agchem RC-30 Series	gal.	.1425 / .34
RC-109 Series	gal.	.235 / .35
SA-9	gal.	.72 / .74
-11, -21	gal.	1.10 / 1.12
-12	gal.	1.01 / 1.03
-16	gal.	.29 / .31
AgeRite Dispersions	lb.	.60 / 2.25
Antox, dispersed	lb.	.54
Aquarex BBX		
Concentrated	lb.	.78
D	lb.	.76
MDL Paste	lb.	.30
ME	lb.	.92
NS	lb.	.60
SMO	lb.	.50
Areskap 50	lb.	.30 / .38
100, dry	lb.	.60 / .72
Aresket 240	lb.	.30 / .38
300, dry	lb.	.60 / .72
Aresklene 375	lb.	.42 / .57
400, dry	lb.	.70 / .84
Black No. 25, dispersed	lb.	.22
Casein	lb.	.24 / .2475
Darex Copolymers Nos. 3-L, 9-L, X34-L, X44-L (total solids)	lb.	.365 / .50
No. X 34-L	lb.	.445 / .50
Dispersed sulfur No. 2	lb.	.10 / .12
Ethyl Thiurad	lb.	1.25
Factex Dispersion A.	lb.	.185
Laton L	lb.	.075 / .0775
Marmix	gal.	1.16 / 1.35
Micronex, colloidal	lb.	.06 / .07
NA-11	lb.	.65
nHR latex chemical	lb.	2.00
Pip-Pin	lb.	1.63
R-2 Crystals	lb.	1.55
Resin V	lb.	.13
S-1	lb.	.80
Santomerse D	lb.	.43 / .65
S	lb.	.13 / .25
Setsit No. 5	lb.	.75 / 1.00
Stablex A	lb.	.90 / 1.10
B	lb.	.70 / .90
G	lb.	.40 / .50
Tepidone	lb.	.55
Tergitol wetting agents	lb.	.265 / .37
Zinc oxide, dispersed	lb.	.25
Mold Lubricants		
Aluminum stearate, precip.	lb.	.47 / .52
Aquarex D	lb.	.75
MDL Past	lb.	.32
Carbowax compounds	lbs.	.24 / .35
Colite Concentrate	gal.	.90 / 1.15
DC Mold Release Fluid	lb.	5.70 / 6.15
Emulsion No. 35	lb.	2.60 / 3.50
Glycerized Liquid Lubricant, concentrated	gal.	1.50
Lubrex	lb.	.25 / .30
Montan Wax	lb.	.57
Para Lube	lb.	.046 / .048
Rubber-Glo	gal.	.97
Sericite	lb.	.0675 / .075
Soapstone	ton	21.00 / 25.00
Sodium stearate	lb.	.19 / .24
Odorants		
Coumarin	lb.	2.75 / 3.30
Curodex 19	lb.	4.75
188	lb.	5.75
198	lb.	6.75
Para-Dor A	lb.	2.00 / 2.50
C	lb.	2.75 / 3.25
E	lb.	.25 / .55
Rodo No. 0	lb.	4.00 / 4.50
No. 10	lb.	5.00 / 5.50
Vanillin	lb.	3.00 / 4.65
Plasticizers and Softeners		
Akroflex C	lb.	$0.53 / $0.55
Armeel HT	lb.	.30 / .35
T	lb.	.27 / .32
TO	lb.	.17 / .22
TOD	lb.	.23 / .28
Aro Lene 1980	lb.	.10 / 0.20
Barak	lb.	.600
Bardex	lb.	.05 / .0525
Bardol	lb.	.0275 / .0375
B	lb.	.055 / .0575
Barium stearate	lb.	.51 / .53
Bondogen	lb.	.55 / .60
B. R. C. Nos. 18, 19E, 20, 22	lb.	.0125 / .0135
B. R. H. No. 2	lb.	.02 / .029
B. R. S. 700	lb.	.0175 / .026
B. R. T. No. 4	lb.	.0265 / .0275
B. R. V.	lb.	.0325 / .049
Bunarex-10, -25, -40	lb.	.075 / .125
-55, -115	lb.	.07 / .12
-70, -100	lb.	.065 / .115
Bunnatol G, S	lb.	.40 / .50
Butac	lb.	.11 / .12
Butyl Roleate	lb.	.16 / .195
Calcium stearate	lb.	.48 / .50
Carbonex Flakes	lb.	.0325 / .0375
S Flakes	lb.	.0475 / .0525
Plastic	lb.	.046 / .051
Contogums	lb.	.0675 / .1025
Cumar EX	lb.	.0525
MH	lb.	.065 / .1175
V	lb.	.0975 / .1275
Dibenzyl phthalate	lb.	.51 / .59
Sebacate	lb.	.67 / .74
Dibutyl phthalate	lb.	.36 / .40
Sebacate	lb.	.7775 / .7925
Dicapryl phthalate	lb.	.25 / .30
Dielex B	lb.	.06
Diethyl phthalate	lb.	.315 / .385
Dimethyl phthalate	lb.	.235 / .305
Dipentene 122	gal.	.60 / .75
Dipolymer oil	gal.	.33 / .38
Dispersing oil No. 10	lb.	.0525 / .055
Double distilled cottonseed fatty acids	lb.	.1175 / .14
Duraplex C-50 LV, 100%	lb.	.25 / .295
Dutrex 6	lb.	.025 / .0375
Emery's 0-18 Elaine	lb.	.255 / .3275
S-24	lb.	.34 / .43
Flexol Plasticizer 3GH	lb.	.55 / .60
3GO	lb.	.515 / .60
4GO	lb.	.40 / .47
8N8	lb.	.395 / .465
DOP	lb.	.379 / .424
TOF	lb.	.45 / .52
Heavy Resin Oil	lb.	.015 / .0225
Hercolyn	lb.	.1122 / .1347
Herron-H.T.	lb.	.17 / .23
Herron-Plas	lb.	.035 /
Herron-Seal	lb.	.1125 / .13
Herron-Wax	lb.	.045
No. 6	lb.	.045 / .0475
8	lb.	.0475 / .05
Indonex	gal.	.115 / .16
JMH	lb.	.65 / .68
Lead oleate	lb.	.2625
Magnesium stearate	lb.	.48 / .49
Migralube	lb.	.30
Multi-Plast	lb.	.0425 / .0475
Naftolen HV	lb.	.11 / .12
LV, MV	lb.	.0525 / .0575
R-100	lb.	.11 / .12
Neo-Fat H.F.O.	lb.	.21 / .22
1-60	lb.	.20 / .21
1-65	lb.	.24 / .25
Neoprene Peptizer P-12	lb.	.75 / .83
Nevillac 10°	lb.	.24
Neville 465 Resin	lb.	.035
R Resins	lb.	.085 / .1375
Nevinol	lb.	.13
Nevoll	lb.	.02 / .025
Nevtex 10	lb.	.0775 / .08
90	lb.	.20
No. 1-D heavy oil	lb.	.04
Palmalene	lb.	.15
Para Resins 2457, 2718	lb.	.04
Paradene Nos. 1, 2	lb.	.0525
33, 34	lb.	.0625
No. 35	lb.	.0575
Para Flux, regular	gal.	.17 / .19
No. 2016	gal.	.19 / .20
Para Lube	lb.	.046 / .048
Paralex A1-111	lb.	.21 / .25
G-25, 100%	lb.	.75
Paroils	lb.	.0975 / .18
Picco-10, -25	lb.	.12 / .17
-75, -100	lb.	.115 / .165
480 Oilproof resin	lb.	.15 / .20
S. O. S.	gal.	.29 / .34
Piccocizer 30	lb.	.055 / .06
Piccolastic Resins	lb.	.125 / .205
Piccolyte Resins	lb.	.17 / .205
Piccoumaron Resin 427-R	lb.	.12 / .17
Resins	lb.	.065 / .195
Piccovars	lb.	.0975 / .1825
Piccovol	lb.	.025 / .04
Pictar	gal.	.25 / .30
Plasticizer 35	lb.	.205 / .24
36	lb.	.305 / .34
1889	lb.	.565
1919	lb.	.55
2069	gal.	.21 / .23
2070	gal.	.25 / .27
B	lb.	.35 / .45
SC	lb.	.75

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Side plate or column presses for compression or transfer or injection molding of rubber and allied synthetics.

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All alert rubber plant executives are now specifying the

ATLAS Type "E"

High Pressure Reducing Valve

For truly "high pressure" jobs — up to 6,000 lb. per sq. in. — oil, water or air. Alert rubber executives know that Type "E" reduces the highest pressures *without the slightest shock.*

Superior in Every Detail

Type "E" is so dependable because it has behind it nearly a half century of highest quality regulating valve experience. That is why it is superior in every detail. The body, for instance, is of forged steel. Internal metal parts are entirely of stainless steel. A formed packing of special material superior to leather is used which is immune to all fluids commonly used in hydraulic machinery. The pressure on the seat is balanced by a piston with the result that variations in high initial pressure have little effect on the reduced pressure.

Ask for complete information.

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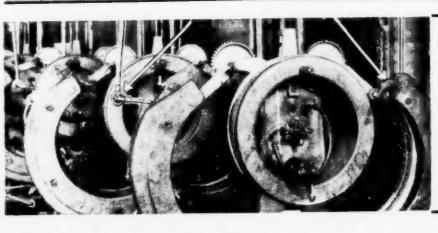
THE FIRST STEP—A QUALITY MOULD



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Plastoflex No. 10	lb.	$0.20
No. 20	lb.	.25
Plastogen	lb.	.0775/ $0.08
Plastone	lb.	.27 / .30
R-19, R-21 Resins	lb.	.1075
Reogen	lb.	.115 / .12
Resin C pitch	lb.	.02 / .0285
R6-3	lb.	.38 / .40
Resinex	lb.	.0325/ .0875
L Grades	lb.	.0225/ .08
Ridbo 369	lb.	.08 / .09
369-F	lb.	.12
RPA No. 2	lb.	.65
No. 3	lb.	.46
No. 5	lb.	.57
RSN Flux	gal.	.10 / .19
Rubberol Compound	lb.	.185
S-Polymers	lb.	.44
Santicizer B-16	lb.	.52 / .57
E-15	lb.	.49 / .54
M-17	lb.	.46 / .51
No. 140	lb.	.3225/ .38
Sebacic acid	lb.	.48 / .55
Solvenol	gal.	.56 / .58
Staybelite Resin	lb.	.06 / .065
Stearex Beads	lb.	.14½/ .15½
Stearic acid, single pressed	lb.	.335 / .345
Double pressed	lb.	.34 / .35
Triple pressed	lb.	.3625/ .3725
Stearite	lb.	.14½
Synprolac	lb.	.185 / .195
Synprowax	lb.	.16
Syn Tac	**lb.**	**.33 / .35**
Synthol	lb.	.225
TR-11	lb.	.035
Tricresyl phosphate	lb.	.31 / .375
Turgum S	lb.	.095 / .105
Tysonite	lb.	.215 / .2225
Vistac No. 1	lb.	1.21 / 1.41
No. 2	lb.	1.61 / 1.75
Wilmac D-X	lb.	.09 / .10
X-1 resinous oil	lb.	.011 / .016
XX-100 Resin	lb.	.0525
Zinc laurate	lb.	.45 / .46

Reclaiming Oils

Bardex	lb.	.05 / .0525
Bardol	lb.	.0275/ .0375
B	lb.	.055 / .0575
B. R. H. No. 2	lb.	.02 / .029
B. R. T. No. 3	lb.	.024 / .025
No. 4	lb.	.013 / .0235
B. R. V.	lb.	.0325/ .049
BWH-1	lb.	.11
Dipentene 122	gal.	.60 / .75
Dipolymer oil	gal.	.33 / .38
Dispersing Oil No. 10	lb.	.0525/ .055
Heavy Resin Oil	lb.	.0225/ .0325
LX-83	gal.	.15 / .23
-572	gal.	.20 / .28
No. 1 heavy oil	lb.	.04
No. 1621	lb.	.025 / .035
Picco C-10	gal.	.25 / .30
C-28	gal.	.33 / .38
C-33	gal.	.215 / .265
C-42	gal.	.30 / .35
D-4	gal.	.23 / .28
E-5	gal.	.21 / .26
Q Oil	gal.	.246 / .296
Solvenol	gal.	.56 / .58
S.R.O.	lb.	.015 / .0225
Wilcor Nos. 111, 151	gal.	.26 / .30
X-60 Solvent	gal.	.20 / .28
X-443	gal.	.20 / .27

Reinforcers, Other Than Carbon Black

B. R. C. Nos. 18, 19E, 20, 22	lb.	.0125/ .0135
Bunarex-55, -115	lb.	.07 / .12
-70, -110	lb.	.065 / .115
Calcene T	ton	40.00 / 50.00
Carbonex, flakes	lb.	.0325/ .0375
S Flakes	lb.	.0475/ .0525
Plastic	lb.	.046 / .051
Clays		
Paragon	ton	10.00
Suprex	ton	11.00 / 23.50
Aluminum flake	ton	15.50 / 25.50
Barden	ton	12.00
Buca	ton	40.00
Catalpo	ton	30.00
China	ton	9.50 / 16.00
Dixie	ton	13.00
Hydratex R	ton	28.00
Hydrowhite	ton	15.00
L.G.B.	ton	17.00
Paragon (R)	ton	12.50
Pigment No. 33	ton	30.00
Suprex	ton	13.00 / 28.70
Witco Nos. 1, 2	ton	25.00
Cumar EX	lb.	.0525
MH	lb.	.065 / .1175
V	lb.	.0975/ .1275
Darex Copolymer No. 3	**lb.**	**.395 / .42**
No. X 34	lb.	.395 / .42
G Resin	lb.	.08
Good-Rite Resin 50	lb.	.415 / .455
Magnesia, Calcined		
Extra light, U.S.P.	lb.	.31 / .33
Light, technical	lb.	.28
No. 101	**lb.**	**.175**
Heavy, technical	lb.	.05 / .1275
Medium light, technical	lb.	.12
Magnesium carbonate	lb.	.0725/ .125
Marbon S, S-1	lb.	.41 / .48
Type B	lb.	.65 / .75
Naftex EPC-80	lb.	$0.0825/ $0.1125
HMF-67	lb.	.06⅝/ .08⅜
-75	lb.	**.07 / .09**
MPC-80	lb.	.0825/ .1125
SRF-67	lb.	.05⅝/ .07¼
-75	lb.	**.05⅞/ .07⅞**
Neville R Resins	lb.	.085 / .1375
Para Resins 2457, 2718	lb.	.04
Picco-75, -100	lb.	.115 / .165
Piccolyte Resins	lb.	.17 / .205
Piccoumaron Resins	lb.	.065 / .195
Piccovars	lb.	.0975/ .1825
Resin C Pitch	lb.	.02 / .0285
Resinex	lb.	.0325/ .0875
S-Polymers	lb.	.44
Silene EF	lb.	.055 / .06
Witcarb R	ton	100.00
R-12	ton	32.50
Zinc oxide, commercial†	lb.	.10 / .12⅞

Retarders

Armeen HTD	lb.	.43 / .53
Cumar RH	lb.	.105
Delac J	lb.	.55 / .60
E-S-E-N	lb.	.34 / .39
M-B-T	lb.	.27 / .33
M-B-T-S	lb.	.35 / .41
R-17 Resin	lb.	.1075
Retarder W	lb.	.43
Retardex	lb.	.475
RM	lb.	1.25
Thionex	lb.	1.25
Thiuram E, M	lb.	1.25
Vultrol	lb.	.50 / .55

Solvents

Benzol, industrial	gal.	.19 / .26
Bondogen	lb.	.55 / .60
Carbon bisulfide	lb.	.0575
Tetrachloride	lb.	.07 / .08
Cosol No. 1	gal.	.26 / .34
No. 2	gal.	.25 / .33
GVL	lb.	1.00
Nevsol	gal.	.185 / .25
Picco Hi-Solv Solvents	gal.	.21 / .26
Skellysolve-B	gal.	.141
C	gal.	.133
R	gal.	.109
Tollac	gal.	.195 / .25
Toluol, industrial	gal.	.23 / .28
2-50-W Hi-Flash Solvent	gal.	.25 / .30
X-60 Solvent	gal.	.20 / .28
Xylol, industrial	gal.	.25 / .45

Synthetic Rubbers

Butaprene NF	lb.	.45 / .60
NL	lb.	.46 / .53
NXM	lb.	.50 / .65
Chemigum Latex Type 101 (solids weight)	lb.	.37 / .40
Chemigum N-1	lb.	.53 / .60
Hycar Latex (dry weight)		
OR-15	lb.	.455 / .53
OR-25	lb.	.385 / .46
Hycar OR-15	lb.	.47 / .505
OR-25, OS-10	lb.	.40 / .435
Neoprene Latex (dry weight)		
Type 571	lb.	.29 / .37
572	lb.	.30 / .38
601, 601-A	lb.	.32 / .40
700	lb.	.30 / .38
842, 842-A	lb.	.29 / .37
Neoprene Type AC	lb.	$0.50
GG	lb.	.50
E, M	lb.	.65
FR, KNR	lb.	.75
NC	lb.	.35
Paraplex X-100	lb.	1.00
Perbunan 18	lb.	.39 / $0.425
26	lb.	.40 / .435
35	lb.	.47 / .505
Latex Type H (55%)	lb.	.38 / .42
Silastic		
Coating and laminating grades		
Nos. 120, 125	lb.	3.80 / 4.40
Molding and extrusion grades		
Nos. 150, 180	lb.	3.35 / 3.95
160, 167	lb.	2.90 / 3.50

Tackifiers

Bunarex-10,-25,-40	lb.	.075 / .125
Hercolyn	lb.	.1122/ .1347
Koresin	lb.	.40 / .52
Natac	lb.	.105 / .115
Nevillac	lb.	.17 / .19
Nevilloid C-55	lb.	.12
Nevindene	lb.	.105 / .135
Picco-10,-25	lb.	.12 / .17
Piccolastic Tackifiers	lb.	.20 / .205
Piccolyte Resins	lb.	.17 / .205
Piccoumaron Resin 427-R	lb.	.12 / .17
Resins	lb.	.065 / .19
Staybelite Resin	lb.	.06 / .065
Synthetic 100	lb.	.41
Synthol	lb.	.225
Vistac No. 1	gal.	1.21 / 1.41
No. 2	gal.	1.61 / 1.75
Vistanex	lb.	.32 / .36

Vulcanizing Agents

Dibenzo G-M-F	lb.	2.65
Ethyl Tuads	lb.	1.00
G-M-F	lb.	2.50
Litharge, commercial	lb.	.166 / .176
Eagle, sublimed	lb.	.17 / .176
FBS	lb.	.17 / .176
Magnesia, Calcined		
Extra-light, U.S.P.	lb.	.31 / .33
Carey	lb.	.28
Light, technical	**lb.**	**.22 / .28**
No. 101	**lb.**	**.175**
Heavy, technical	**lb.**	**.05 / .31**
Medium-light, technical	**lb.**	**.175**
Methyl Selenac	lb.	1.60
Tuads	lb.	1.25
Red lead, commercial	lb.	.17 / .19
Eagle	lb.	.18 / .185
#2 RM	lb.	.18 / .186
Sulfur flour, commercial	100 lbs.	1.90 / 2.75
Crystex	lb.	.32 / .45
Dichloride	lb.	.0325/ .0825
Insoluble 60	lb.	.16
Monochloride	lb.	.0325/ .0825
Rubbermakers	100 lbs.	1.50 / 2.00
Telloy	lb.	2.00
Vandex	lb.	2.00
Vultac Nos. 1, 2	lb.	.38 / .45
No. 3	lb.	.42 / .49
White lead silicate	lb.	.16 / .175
Eagle	lb.	.1685

Shipments and Consumption of Plastics and Resins

THE following statistics represent the shipments and consumption, in pounds, of plastics and synthetic resins for the third quarter of 1947, as reported to the Bureau of the Census, United States Department of Commerce, by 83 manufacturing companies and company departments. Data on synthetic resins for protective coatings are not included.

	July	August	September
Cellulose acetate and mixed ester plastics*	4,189,342	4,882,634	5,406,407
Nitrocellulose plastics*	892,223	902,673	920,512
Phenolic and other tar acid resins:			
Laminating (dry basis)	3,146,258	2,711,686	3,396,258
Adhesives (dry basis)	1,521,047	1,590,097	1,766,449
Molding materials*	16,638,810	17,895,179	17,408,459
All other (dry basis)†	4,643,124	3,803,392	4,735,441
	25,949,239	26,000,354	27,306,607
Urea and melamine resins:			
Adhesives (dry basis)	3,887,083	3,604,625	3,995,240
Textile and paper treating (dry basis)	1,175,423	1,343,035	1,274,285
All other, including laminating (dry basis)†‡	473,743	514,137	455,216
	5,536,249	5,461,797	5,724,741
Polystyrene†§	5,687,761	7,075,382	8,381,059
Vinyl resins:			
Sheeting and film*	3,721,930	4,105,498	5,790,041
Textile and paper coating (resin content)	1,537,288	1,649,818	1,193,678
Molding and extrusion (resin content)	4,567,317	4,826,062	5,787,689
All other, including adhesives (resin content)†	1,746,715	2,335,582	2,353,845
	11,573,250	12,916,960	15,125,253
Miscellaneous plastics and resins*†¶	5,818,737	5,567,305	8,032,166
TOTALS	59,646,801	62,807,105	70,896,745

*Includes fillers, plasticizers, and extenders.
†Excludes data for protective coating resins.
‡Urea and melamine molding materials are included with miscellaneous molding materials.
§Dry basis, including necessary coloring materials.
¶Includes data for urea, melamine, acrylic acid, and miscellaneous molding materials, petroleum resins, acrylic acid ester resins, resin mixtures, and miscellaneous synthetic materials.

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Rims Approved and Branded by The Tire & Rim Association, Inc.

Rim Size	Jan., 1948
15" & 16" D.C. Passenger	
16x4.00E	432,833
15x4.50E	16,675
16x4.50E	229,512
15x5.00E	130,481
16x5.00F	7,638
15x5.50F	56,467
16x5.50F	11,041
16x6.00F	3,762
16x4.00E—Hump	23,301
16x4.50E—Hump	10,595
15x5.00F—Hump	6,602
15x4½-K	24,179
16x4½-K	39,023
15x5-K	199,465
16x5-K	191,837
15x5½-K	23,814
16x5½-K	15,965
15x6-L	59,443
16x6-L	39,053
15x6½-L	89,985
15x4½-K—Hump	204,178
15x5-K—Hump	120,220
15x5½-K—Hump	77,190
15x6-L—Hump	18,951
Flat Base Truck	
17x4.33R	3,187
20x4.33R	4,181
17x5.0	8,010
18x5.0	11,101
20x5.0	12,689
18x5.00S	873
20x5.00S	34,164
24x5.00S	18
17x5.5	11,173
15x6.0	547
20x6.0	152,428
20x6.00S	118,175
20x6.00T	15,778
20x6.5	16,319
20x6.50T	24,413
20x7.0	6,008
15x7.00T	123
20x7.00T	19,922
22x7.00T	1,077
15x7.33V	308
20x7.33V	1,531
22x7.33V	3,767
20x7.5	15,026
22x7.5	6,780
20x7.50V	10,615
22x7.50V	4,186
24x7.50V	467
20x8.0	876
22x8.0	724
19x8.37V	952
20x8.37V	725
24x8.37V	438
24x10.00W	2,204
Semi D. C. Truck	
15x5.50F	44,766
16x5.50F	36,191
16x6.50H	14,353
Tractor and Implement	
12x2.50C	21,101
12x3.00D	37,112
15x3.00D	19,496
19x3.00D	17,482
16x4.25KA	10,854
20x4.50E	9,948
36x4.50E	1,122
13x5.50F	1,171
18x5.50F	22,817
20x5.50F	12,958
24x5.50F	2,928
20x8.00T	1,107
24x8.00T	3,628
28x8.00T	507
36x8.00T	521
W6-24	4,684
W7-24	6,499
W8-24	21,093
W8-32	569
W8-36	648
W9-36	773
W9-38	3,476
W10-24	2,222
W10-28	2,442
W10-38	2,011
DW9-38	3,977
DW10-38	7,399
DW11-38	5,619
DW12-26	3,530
DW12-30	628
DW12-34	2,109
DW16-26	618
Earth Mover	
24x11.25	332
24x13.00	136
32x13.00	1
24x15.00	190
25x15.00	490
29x17.00	440
33x17.00	20
33x19.50	3
33x22.00	98
TOTAL	2,849,064

United States Rubber Industry Employment, Wages, and Hours

	Prod. Workers, 100's	Prod. Workers Index	Prod. Workers Payroll Index	Avg. Weekly Earnings	Avg. Weekly Hours	Avg. Hourly Earnings	Consumers' Price Index
All Rubber Products							
1939	121	100.0	100.0	$27.84	36.9	$0.754	99.4
1943	194	160.3	263.9	....	....	....	133.5
1946							
September	229	189.1	363.9	53.69	40.6	1.323	145.9
October	236	194.8	361.3	51.74	39.4	1.313	148.6
November	240	198.8	377.4	52.93	40.0	1.323	152.2
December	242	200.1	392.2	54.63	41.1	1.331	153.3
1947							
January	240	198.8	386.3	54.03	40.6	1.330	153.3
February	240	198.2	385.0	54.06	40.6	1.331	153.2
March	238	196.5	374.3	52.97	39.8	1.330	156.3
April	234	193.5	383.9	55.23	39.5	1.397	156.2
May	223	184.5	367.2	55.30	39.0	1.416	156.0
June	219	180.7	361.9	55.49	39.1	1.419	157.1
July	212	175.2	352.7	55.77	38.6	1.446	158.4
August	216	178.2	357.0	55.60	38.4	1.446	160.3
Tires and Tubes							
1939	54.2	100.0	100.0	$33.36	35.0	$0.957	
1943	90.1	160.2	265.7	....	..	....	
1946							
September	122.6	226.0	400.2	59.89	39.6	1.507	
October	127.1	234.4	397.6	57.38	38.2	1.492	
November	129.2	238.3	414.7	58.87	39.0	1.503	
December	129.0	237.9	425.3	60.46	39.8	1.513	
1947							
January	127.7	235.5	416.3	59.78	39.5	1.511	
February	126.6	233.3	413.3	59.90	39.3	1.517	
March	125.5	231.4	397.3	58.05	38.2	1.512	
April	123.1	227.0	414.2	61.64	38.2	1.608	
May	119.3	220.0	399.3	61.12	37.6	1.622	
June	117.7	217.0	396.1	61.35	37.7	1.615	
July	115.1	212.3	393.8	62.06	37.9	1.640	
August	117.5	216.6	397.0	61.29	37.4	1.641	
Boots and Shoes							
1939	14.8	100.0	100.0	$22.80	37.5	$0.607	
1943	23.8	160.5	268.8	....	..	....	
1946							
September	21.0	141.5	285.2	45.27	41.5	1.091	
October	21.4	144.0	249.6	38.93	37.3	1.043	
November	22.4	151.0	295.4	43.80	40.4	1.083	
December	23.0	154.8	318.0	45.93	42.0	1.093	
1947							
January	23.2	156.5	322.5	46.06	41.9	1.099	
February	23.8	160.2	328.5	45.83	42.0	1.098	
March	23.8	160.1	321.7	44.91	41.2	1.090	
April	23.5	158.4	333.3	47.03	40.8	1.152	
May	22.8	153.6	331.2	48.27	40.7	1.185	
June	21.4	143.9	317.1	49.62	41.4	1.198	
July	20.0	134.4	289.1	48.46	40.5	1.187	
August	18.8	126.5	267.6	47.23	39.9	1.183	
Other Rubber Goods							
1939	51.9	100.0	100.0	$23.34	38.9	$0.605	
1943	79.9	154.1	255.8	....	..	....	
1946							
September	85.2	164.3	327.6	47.01	41.8	1.125	
October	87.1	167.9	335.3	47.00	41.6	1.130	
November	88.8	171.3	340.4	46.74	41.4	1.130	
December	89.9	173.4	359.9	48.68	42.6	1.143	
1947							
January	89.6	172.8	354.5	48.12	42.0	1.146	
February	89.5	172.6	354.4	48.27	42.1	1.147	
March	88.3	170.2	348.7	48.23	41.8	1.154	
April	87.3	168.4	348.4	48.53	41.0	1.184	
May	81.0	156.3	325.5	48.81	40.6	1.201	
June	79.5	153.2	320.1	48.95	40.5	1.209	
July	76.8	148.0	304.9	48.22	39.1	1.232	
August	79.2	152.8	318.9	49.08	39.4	1.240	

United States Rubber Statistics, November, 1947

(All Figures in Long Tons, Dry Weight)

	New Supply			Distribution		Stocks, End of Month
	Production	Imports	Total	Consumption	Exports	
Natural rubber, total	0	48,846*	48,846	50,374	514	105,610
Natural latex, total	0	1,994	1,994	1,702	0	5,142
Natural rubber and natural latex, total	0	50,840	50,840	52,076	514	110,752
Synthetic rubber, total	36,416					
	1,409‡	634	38,459	39,091	188	67,871
GR-S	29,217†					
	452‡	634	30,303	30,748	70	46,366
Butyl	5,194†	0	5,194	5,125	0	12,905
Neoprene	2,005†					
	514‡	0	2,519	2,852	103	5,155
Nitrile	443‡	0	443	366	15	3,445
Natural rubber and latex, and synthetic rubber, total	37,825	51,474	89,299	91,167	702	178,623
Reclaimed rubber, total	23,161	0	23,161	23,491	1,339	36,425
Grand Totals	60,986	51,474	112,460	114,658	2,041	215,048

* Imports for November were 48,896 tons, but are shown minus adjustments of 19 tons applicable to April and 31 tons applicable to September.
† Government plant production.
‡ Private plant production.
SOURCE: OMD, United States Department of Commerce.

United States Imports, Exports, Reexports, Crude and Manufactured Rubber

Exports of Domestic Merchandise

	September, 1947		October, 1947	
	Quantity	Value	Quantity	Value
UNMANUFACTURED, Lbs.				
Crude rubber	48,975	$7,012	.....	.....
Chicle	151,450	117,246	163,669	$167,782
Balata	3,036	12,981	1,722	6,888
Jelutong and gutta percha	.....	.....	2,680	5,413
Synthetic rubber: GR-S	114,640	170,010	29,400	5,729
Butyl	.....	.....	12,200	2,507
Neoprene	527,344	164,956	280,817	93,523
Nitrile	128,656	59,967	113,842	37,453
"Thiokol"	.....	.....	194	228
Polyisobutylene	5,997	1,919	10,421	3,272
Other	6,070	5,384	6,194	5,705
Reclaimed rubber	2,019,554	152,342	2,276,323	183,224
Scrap rubber	3,578,215	88,314	6,439,265	189,141
TOTALS	6,583,937	$780,131	9,336,727	$700,865
MANUFACTURED				
Rubber cement ..*gals.*	54,081	$69,912	115,531	$130,527
Rubberized fabric: auto cloth *sq. yds.*	10,025	8,743	65,431	54,841
Piece goods and hospital sheeting *sq. yds.*	115,950	79,223	133,079	112,317
Rubber footwear:				
Boots *prs.*	53,110	168,150	55,367	176,175
Shoes *prs.*	40,265	76,914	36,532	68,125
Rubber soled canvas shoes *prs.*	105,724	170,525	190,889	289,223
Soles *doz. prs.*	28,574	53,158	50,157	60,616
Heels *doz. prs.*	59,449	60,364	77,780	54,124
Rubber soling and top lift sheets *lbs.*	54,016	14,036	138,805	31,979
Gloves and mittens *doz. prs.*	17,759	56,171	22,692	75,218
Druggists' sundries:				
Water bottles and fountain syringes *no.*	47,064	30,145	60,342	32,099
Other products	.....	264,123	.....	390,118
Rubber and rubberized clothing	.....	140,867	.....	140,337
Balloons	.....	223,920	.....	308,347
Rubber toys and balls	.....	73,347	.....	72,898
Bathing caps *doz.*	3,545	17,210	2,606	9,180
Rubber bands *lbs.*	16,875	11,501	11,769	10,971
Erasers *lbs.*	30,440	32,170	43,809	42,540
Hard rubber goods:				
Battery boxes *no.*	33,488	32,407	26,941	33,087
Other electrical goods *no.*	107,999	58,261	115,656	51,117
Combs *doz.*	10,874	8,784	11,333	9,029
Other	.....	21,281	.....	29,182
Tire casings:				
Truck and bus *no.*	128,887	4,739,452	134,586	5,594,085
Auto *no.*	151,468	2,002,530	159,202	2,249,427
Inner tubes: auto, truck, and bus *no.*	156,887	504,413	180,913	756,742
Other tire casings and inner tubes *no.*	117,258	773,618	83,917	908,383
Solid tires:				
Auto and truck *no.*	32,750	957,247	44,894	927,466
Other *lbs.*	82,817	22,198	44,275	22,577
Tire repair materials:				
Camelback *lbs.*	.....	.....	101,036	27,508
Other *lbs.*	336,808	179,889	220,217	149,080
Rubber and friction tape *lbs.*	84,312	52,436	87,660	53,177
Belting:				
Auto fan belts *lbs.*	214,888	231,221	206,710	233,684
Other *lbs.*	1,223,488	1,073,133	1,348,982	1,272,638
Hose and tubing:				
Garden hose *lbs.*	60,985	23,853	59,693	21,814
Other *lbs.*	902,356	601,196	912,483	636,302
Rubber packing *lbs.*	313,686	149,312	253,990	167,418
Rubber mats flooring, and tiling *lbs.*	577,2444	182,555	700,461	176,939
Thread: bare *lbs.*	52,290	74,066	95,658	141,367
Textile covered *lbs.*	9,567	21,598	14,157	26,227
Gutta percha manufactures *lbs.*	3,128	7,489	2,123	2,193
Compounded latex and other rubber for further manufacture *lbs.*	381,705	141,560	233,854	114,145
Other rubber products	.....	326,229	.....	330,465
TOTALS	.....	$13,735,107	.....	$15,994,687
GRAND TOTALS, ALL RUBBER EXPORTS		$14,515,238		$16,695,552

Imports for Consumption of Crude and Manufactured Rubber

	September, 1947		October, 1947	
	Quantity	Value	Quantity	Value
UNMANUFACTURED, Lbs.				
Crude rubber	102,331,297	$14,573,168	105,035,328	$14,819,306
Rubber latex	1,156,722	324,206	6,661,607	1,370,242
Guayule	98,900	10,414	.....	.....
Balata	190,568	120,633	662,412	389,245
Jelutong or Pontianak	913,215	192,352	888,456	187,255
Gutta percha	29,355	22,333	88,044	88,776
Chicle	58,099	47,843	233,767	147,458
Scrap rubber	733,920	8,834	808,232	8,701
TOTALS	105,511,976	$15,299,783	114,377,846	$17,010,983
MANUFACTURED				
Tires: auto, bus, and truck *no.*	381	$14,752	18	$1,063
Bicycle *no.*	1,660	1,041	321	506
Other *no.*	3	400	.....	.....
Inner tubes *no.*	380	3 038	68	426
Rubber boots, shoes and overshoes *prs.*	26,871	26,451	721	390
Rubber-soled canvas shoes *prs.*	33	177	124,477	168,124
Heels and soles *doz. prs.*	26,162	1,255	1,000	192
Athletic balls: golf *no.*	2,403	668	9,600	2,668
Lawn tennis *no.*	.....	.....	14,400	545
Rubber toys	.....	.....	.....	223
Hard rubber products	.....	1,510	.....	6,203
Rubberized printing blankets *lbs.*	565	1,115	1,433	2,957
Rubber gaskets and valve packing	.....	41	.....	2,309
Belting *lbs.*	.....	.....	1,799	4,023
Hose and tubing	.....	59	.....	264
Bands *lbs.*	.....	.....	1	1
Soft rubber:				
Druggists' sundries	.....	.....	.....	271
Other products	.....	4,711	.....	6,617
Rubber substitute products *lbs.*	7,400	1,379	40,305	2,824
TOTALS	.....	$56,597	.....	$199,606
GRAND TOTALS, ALL RUBBER IMPORTS	.....	$15,356,380	.....	$17,210,589

Reexports of Foreign Merchandise

UNMANUFACTURED, Lbs.				
Crude rubber	388,925	$95,460	703,798	$164,520
Balata	.....	.....	38,329	44,928
Chicle	12,630	14,709	.....	.....
TOTALS	401,555	$110,169	742,127	$209,448
MANUFACTURED				
Tire casings and tubes *no.*	31	$231	.....	.....
Rubber and balata belting *lbs.*	172	133	60	$52
Hose and tubing *lbs.*	.....	.....	4,967	3,325
Friction tape *lbs.*	.....	.....	100	90
Packing *lbs.*	.....	.....	377	227
Cement *gals.*	805	845	500	525
Druggists' sundries:				
Water bottles and fountain syringes *no.*	.....	.....	11,200	10,540
Other products	.....	1,595	.....	4,709
Tire repair materials, except camelback *lbs.*		.....	60	60
Other rubber products	.....	187	.....	467
Compounded latex and other rubber for further manufacture *lbs.*	35,270	7,089	21,509	5,556
TOTALS	.....	$11,487	.....	$27,551
GRAND TOTALS, ALL RUBBER REEXPORTS	.....	$121,656	.....	$236,999

Letter to the Editor

(*Continued from page 742*)

Malacca was one of the Straits Settlements and is now part of the Malayan Union. As is well known to all who are familiar with Malaya, it has no connection with the F. M. S.

Yours truly,
P. T. BAUER

"Rubber Science and Technology. Part IX of Chemistry in Wartime in the Netherlands." A. van Rossem. Published under the auspices of the Netherlands Chemical Society by D. B. Centen's Uitgevers Maatschappij Amsterdam. 38 pages. This bulletin, which reviews scientific work done by Dutch chemists in the years 1940-1945, is of special interest, first, because it explains the relation between the Netherland's Government Rubber Institute (Rubber Research Institute T.N.O.) and the Rubber Foundation, both at Delft. The former, founded in 1910, is now a part of the Organization of Applied Scientific Research constituted in the Netherlands in 1932, of which the Rubber Research Institute T.N.O. became a part in 1941; the Rubber Foundation was constituted in 1936 in connection with the International Rubber Restriction Agreement and parallels the Rubber Producers' Research Association in England and the *Institut français du Caoutchouc* in France.

The bulletin is in six parts and discusses separately latex, raw rubber, synthetic rubber-like materials, vulcanization, properties of vulcanized rubber, and analysis and testing. Included also are subjects and authors' indices and a list of literature references.

FINANCIAL

Brown Rubber Co., Inc., Lafayette, Ind. For 1947: net profit, $810,890, equal to $3 a share, against $361,728, or $1.44 a share in 1946; current assets, December 31, 1947, $1,333,165, current liabilities, $869,560.

The Philip Carey Mfg. Co., Cincinnati, O. For 1947: consolidated net profit, $2,806,692, equal to $3.41 a common share, against $2,149,411, or $2.58 a share, the year before.

Crown Cork International Corp., Baltimore Md., and wholly owned domestic subsidiary. For 1947: net profit, $415,941, equal to $2.21 a share on Class A stock, compared with $316,434, or $1.68 a share, a year earlier.

Endicott Johnson Corp., Endicott, N. Y. Year ended November 30, 1947: net profit, $2,938,395, or $3.27 each on 810,720 common shares, contrasted with $2,377,350, or $5.15 each on 405,360 common shares, in the preceding fiscal year; sales $142,029,121, a new high, against $105,888,544.

Flintkote Co., New York, N. Y., and subsidiaries. For 1947: net income, $7,802,379, equal to $6.27 each on 1,183,921 common shares, contrasted with $3,710,723, or $2.81 a share in 1946; sales, $73,625,154, a new record, against $52,577,403; taxes, $5,086,018, against $2,489,311.

General Cable Corp., New York, N. Y. For 1947: net profit, $6,158,205, equal to $2.79 each on 1,898,614 common shares outstanding, compared with $3,045,421, or $1.13 a share, in 1946, when several work stoppages occurred in company plants; inventories at year-end, $8,421,138, against $10,208,371; current assets, $45,439,625, current liabilities, $7,402,517, against $27,922,217 and $6,754,142, respectively, a year earlier.

B. F. Goodrich Co., Akron, O. For 1947: consolidated net income, $23,231,063, equal to $16.18 a common share, compared with $25,207,871, or $17.69 a share, in 1946; consolidated net sales, $410,180,839, against $361,471,149; reserve for contingencies, $6,500,000, against $10,500,000; current assets, December 31, 1947, $165,772,294, current liabilities, $35,053,680, contrasted with $146,778,955 and $33,451,077, respectively, at the preceding year-end; inventories, $88,940,417, against $78,531,128.

Goodyear Tire & Rubber Co., Akron, O. For 1947: consolidated net income, $33,044,943, equal, after all charges, to $10.93 a common share, contrasted with $36,211,784, or $16.07 a share, a year earlier; sales, $670,772,647, against $616,508,162; reserve for possible loss on foreign investments, $7,500,000, against $15,000,000; income taxes, $29,549,263, against $43,020,255; current assets, December 31, 1947, $291,453,679, including $63,411,050 cash and $149,453,679 inventories, current liabilities, $48,410,688; respective figures, December 31, 1946, $223,190,673, $750,792,703, $101,684,827, and $48,630,459.

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, and Inventory — December and November, 1947; Total Year, 1947, 1946

	1947				
Passenger Casings	December	% of Change from Preceding Month	November	Year 1947	Year 1946
Shipments					
Original equipment	1,918,587		1,712,343	19,643,834	11,086,542
Replacement	3,326,388		4,594,763	52,865,313	54,682,036
Export	91,308		106,248	1,607,654	652,643
Total	5,336,283	- 16.80	6,413,354	74,116,801	66,423,221
Production	6,622,352	+3.76	6,382,557	77,790,410	66,466,319
Inventory end of month	5,469,968	+36.35	4,011,831	5,469,968	1,763,472
Truck and Bus Casings					
Shipments					
Original equipment	418,978		385,008	5,410,778	4,223,610
Replacement	702,870		1,008,326	10,024,868	10,806,211
Export	124,514		108,657	1,641,827	859,369
Total	1,246,362	- 17.02	1,501,991	17,077,473	15,889,190
Production	1,427,429	+7.05	1,333,479	17,757,981	15,831,862
Inventory end of month	1,505,192	+18.95	1,265,373	1,505,192	684,800
Total Automotive Casings					
Shipments					
Original equipment	2,337,565		2,097,351	25,054,612	15,310,152
Replacement	4,029,258		5,603,089	62,890,181	65,490,247
Export	215,822		214,905	3,249,481	1,512,012
Total	6,582,645	- 16.84	7,915,345	91,194,274	82,312,411
Production	8,049,781	+4.33	7,716,036	95,548,391	82,298,181
Inventory end of month	6,975,160	+32.18	5,277,204	6,975,160	2,448,272
Passenger and Truck and Bus Tubes					
Shipments					
Original equipment	2,334,339		2,092,267	25,038,532	15,326,821
Replacement	2,872,584		4,124,496	49,107,063	59,356,827
Export	117,270		126,305	2,495,786	1,424,036
Total	5,324,193	- 16.06	6,343,068	76,641,381	76,107,684
Production	6,543,644	+1.35	6,456,738	79,509,292	77,250,995
Inventory end of month	8,087,937	+21.02	6,682,871	8,087,937	3,819,844

NOTE: Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers Association, Inc.

Dividends Declared

COMPANY	STOCK	RATE	PAYABLE	STOCK OF RECORD
Boston Woven Hose & Rubber Co.	Com.	$0.50 q.	Feb. 25	Feb. 16
Brown Rubber Co.	Com.	0.20 res.	Mar. 1	Feb. 18
Brunswick-Balke-Collender Co.	Com.	0.25	Mar. 15	Mar. 1
Brunswick-Balke-Collender Co.	Pfd.	1.25 q.	Apr. 1	Mar. 20
Canada Wire & Cable Co., Ltd.	"A"	1.00 red.	Mar. 15	Feb. 29
Canada Wire & Cable Co., Ltd.	"B"	0.25 red.	Mar. 15	Feb. 29
Crown Cork International	"A"	0.40 accum.	Apr. 1	Mar. 10
Electric Hose & Rubber Co.	Com.	0.30 q. irr.	Feb. 20	Feb. 16
E. I. du Pont de Nemours & Co., Inc.	Com.	2.00	Mar. 13	Feb. 24
E. I. du Pont de Nemours & Co., Inc.	$4.50 Pfd.	1.12½ q.	Apr. 26	Apr. 9
E. I. du Pont de Nemours & Co., Inc.	$3.50 Pfd.	0.87½ q.	Apr. 26	Apr. 9
Flintkote Co.	Com.	0.50 q.	Mar. 10	Feb. 25
Flintkote Co.	Pfd.	1.00 q.	Mar. 15	Mar. 1
General Motors Corp.	$5 Pfd.	1.25 q.	May 1	Apr. 5
General Motors Corp.	$3.75 Pfd.	0.93¾ q.	May 1	Apr. 5
General Tire & Rubber Co.	Com.	0.25 q.	Feb. 27	Feb. 20
Hewitt-Robins, Inc.	Com.	0.25 q.	Mar. 15	Feb. 25
I. B. Kleinert Rubber Co., Inc.	Com.	0.25	Mar. 11	Feb. 27
Lea Fabrics, Inc.	Com.	0.37½ irr.	Feb. 27	Feb. 10
Minnesota Mining & Mfg. Co.	Com.	0.50 q.	Mar. 12	Feb. 28
Minnesota Mining & Mfg. Co.	Pfd.	1.00	Mar. 12	Feb. 28
Seiberling Rubber Co.	Pfd.	1.13 q.	Apr. 4	Mar. 15
Seiberling Rubber Co.	Pfd. A	1.25 q.	Apr. 4	Mar. 15
Shellmar Products Co.	Com.	0.25 q.	Apr. 1	Mar. 15
Swan Rubber Co.	4.8% Pfd.	1.25 q.	Feb. 2	Jan. 22
United States Rubber Co.	Com.	1.00	Mar. 10	Feb. 23
United States Rubber Co.	Pfd.	2.00 q.	Mar. 10	Feb. 23
United States Rubber Co.	Pfd.	2.00 q.	June 10	May 24

Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont., Canada. For 1947: net profit, $3,931,248, equal to $14.04 a common share, against $1,660,013, or $5.40 a share, in the preceding 12 months.

Koppers Co., Inc., Pittsburgh, Pa. For 1947: consolidated net income, $6,165,783, equal to $4.94 a common share, compared with $3,205,475, or $2.79 a share, the year before; consolidated sales, $162,931,072, against $112,651,379; taxes, $7,486,534, against $4,001,030.

Sun Oil Co., Philadelphia, Pa., and subsidiaries. For 1947: consolidated net income, $24,339,912, equal to $5.28 a share, against $14,726,551, or $4.17 a share, in 1946.

The Mohawk Rubber Co., Akron, O. For 1947: net profit, $499,619, equal to $3.53 a common share, contrasted with $1,044,689, or $7.37 a share, in 1946; net sales, $8,242,956 against $10,088,446; federal income taxes, $318,563, against $714,847; current assets, December 31, 1947, $2,838,730, current liabilities, $257,475, against $2,979,240 and $476,487, respectively, a year earlier.

Plymouth Rubber Co., Inc., Canton, O. Year ended November 30, 1947: net profit, $1,126,226, equal to $1.25 each on 900,000 common shares, against $2,149,549, or $2.38 a share, in the year ended November 30, 1946. Plant was closed because of a strike August 3 to September 6, 1947.

(*Continued on page* 816)

CLASSIFIED ADVERTISEMENTS

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Effective July 1, 1947

GENERAL RATES
Light face type $1.25 per line (ten words)
Bold face type $1.60 per line (eight words)
Allow nine words for keyed address.

SITUATIONS WANTED RATES
Light face type 40c per line (ten words)
Bold face type 55c per line (eight words)

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Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.

SITUATIONS WANTED

PLANT ENGINEER—WITH OVER 35 YEARS OF PRACTICAL diversified rubber and plastics manufacturing and production experience with large and small companies, also foreign employment experience. Will accept temporary or permanent employment on plant construction work, plant layout, power plant installation, moving, erection, and installation of production equipment, plant and equipment maintenance engineering. Will advise set-up necessary to produce any type of rubber or plastic products, versed in compounding and mold designing. At present employed as Plant Engineer of large company; will go anywhere; desire to do consulting work. Address Box No. 49, care of INDIA RUBBER WORLD.

CONSULTING WORK: CHEMISTRY, PHYSICS, ENGINEERING, organization, by an experienced CONSULTING ENGINEER. Address Box No. 50, care of INDIA RUBBER WORLD.

REGISTERED PATENT AGENT: CHEMIST, TWO SCIENTIFIC degrees, extentive patent experience in chemical and mechanical arts, available for part-time work. Address Box No. 51, care of INDIA RUBBER WORLD.

FACTORY MANAGER. EXECUTIVE TYPE. FULLY EXPERIENCED IN ALL PLANT OPERATIONS. MACHINERY INSTALLATION AND MAINTENANCE. EXPERT COMPOUNDER. MILLING. CALENDERING. EXTRUDING. STOCK PREPARATION. CONVENTIONAL AND INJECTION MOLDING. COSTING AND TIME STUDY. EXPERT CHEMIST. CAN HANDLE HELP. ADDRESS BOX NO. 52, CARE OF INDIA RUBBER WORLD.

CHEMIST, RUBBER, 6 YEARS' EXPERIENCE HARD, SOFT rubber, latex, vinyl sheeting; laboratory, pilot-plant and plant. Desires supervisory position in Newark or New York metropolitan area or wherever housing is guaranteed. Address Box No. 53, care of INDIA RUBBER WORLD.

DIRECTOR LABOR RELATIONS AND PERSONNEL, 48, WITH 25 years' experience policy formation and administration all phases, negotiate agreements C.I.O. and A.F.L. Unions. Proven record of successful labor management. Now Consultant, but desires change. Complete résumé on request. Address Box No. 70, care of INDIA RUBBER WORLD.

EXECUTIVE-RESEARCH-CHEMIST: TWENTY YEARS' EXperience in direction, coordination, and pursuit of research developments, through production, specifications, and controls. Rubber compounding, mechanical, and cellular. Latex processing, foam and dipped. Laboratories established. Excellent collegiate, industrial, and administrative background. Available immediately. Location immaterial. Address Box No. 73, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

RUBBER ENGINEER

Midwest Mfr. desires man experienced in moulding and manufacture of rubber products for the printing industry. Good salary — Advancement. Replies kept strictly confidential. Address Box No. 71, Care of INDIA RUBBER WORLD.

WANTED

Chemical Engineer or Chemist

for Technical Service Work

Age 25-35

Rubber compounding experience desirable

Knowledge of French an asset

Write Box #46, c/o INDIA RUBBER WORLD

SITUATIONS OPEN (Continued)

WANTED

By manufacturers in Chile, Chemical Engineer with expert knowledge and experience in the manufacture of rubber flooring and tiles, and with general experience in the production of other rubber goods, such as hose, rubber-soled shoes and belting, but excluding bicycle tires and tubes.

Engineer must be capable of taking charge and developing the industry, especially in the floor tile and belting departments.

Contract for four or five years will be given to suitable man, and all expenses to and from Chile will be paid.

Write fully with recent photograph, stating age, education, experience, references, and salary desired.

Box No. 48, Care of INDIA RUBBER WORLD

WANTED: RUBBER CHEMIST AND TECHNOLOGIST

Opening for the right man in service compounding and development work in connection with the manufacture and sale of chemicals for the rubber trade. Ability to work out formulations and write technical trade bulletins called for. A knowledge of factory scale processing methods for natural and synthetic rubber is essential. Experience in tire and tube compounding preferable but mechanical or insulated wire compounding is also considered as a qualification.

In reply, give details of education, experience, positions held and references.

All inquiries treated strictly confidential.

Address Box No. 47, Care of INDIA RUBBER WORLD.

FACTORY MANAGER EXPERIENCED IN COMPOUNDING AND manufacture of mechanical goods and solid rubber tires. Sales experience required. Excellent opportunity. Address Box No. 54, care of INDIA RUBBER WORLD.

RUBBER CHEMIST AND TECHNICAL REPRESENTATIVE with five years or more active experience in the compounding and manufacture of tires or mechanical goods, for work in rapidly expanding sales division of a large established company. Excellent opportunity for person with proper training and qualifications. Advise age, experience in detail, date available, and salary required. All replies kept strictly confidential. Address Box No. 57, care of INDIA RUBBER WORLD.

FACTORY SUP'T FOR MEDIUM-SIZED MECHANICAL RUBBER goods plant, capable of taking complete charge of operations. Must be familiar with compounding, extruding, molding, and trimming operations. Should have thorough knowledge of molding design and factory routine. Chemical background very desirable, but not necessary. State age, education, and experience. Salary commensurate with experience and ability. Address Box No. 58, care of INDIA RUBBER WORLD.

PLASTIC ENGINEER, EXPERIENCED IN ALL PHASES OF DEsigning molds and operation of injection molding machines. Progressive manufacturing firm in New Haven area. Address Box No. 59, care of INDIA RUBBER WORLD.

CHEMIST, CHEMICAL ENGINEER—WITH WIDE EXPERIENCE in compounding for calendered unsupported vinyl film, knowledge of processing equipment and laboratory testing procedure. In reply state age, salary expected, and details of experience and education. Address Box No. 60, care of INDIA RUBBER WORLD.

WANTED: MECHANICAL RUBBER GOODS SUPERINTENDENT for plant in northern Ohio employing 200. Address Box No. 63, care of INDIA RUBBER WORLD.

(*Classified Advertisements Continued on Page* 817)

Malayan Rubber Statistics

The following statistics for December, 1947, have been received from Singapore by way of Malaya House, 57 Trafalgar Square, London, W. C. 2, England.

Ocean Shipments from Singapore and Malayan Union—In Tons

To	Sheet and Crepe			Latex, Concentrated Latex, and Revertex (Dry Rubber Content)		
	Singapore Export Proper	Malayan Union Trans-shipped	Malayan Union Direct Shipments	Singapore Export Proper	Malayan Union Trans-shipped	Malayan Union Direct Shipments
Argentine Republic	...	...	6	...	...	...
Australia	802	500	...	14	39	...
Belgium	453	281	694	11	13	4
Canada	637	26	1,575	...	...	...
Chile	100	...	175	...	...	...
China	914	...	736	...	...	...
Cyprus	22	...	...	...	...	...
Czechoslovakia	200	...	...	...	...	...
Denmark	50	...	160	4	...	...
Egypt	10	...	...	...	...	...
Eire	...	1	4	...	...	...
Finland	...	...	...	2	...	...
France	745	152	1,190	142	120	117
Germany	730	135	1,707	30	...	...
Hong Kong	222	30	111	...	...	...
Italy	568	177	304	...	13	...
Japan	1,820	...	50	...	...	...
Mexico	390	...	390	2	...	...
Netherlands	944	60	283	48	6	...
New Zealand	85	50	...	...	3	...
Norway	15	100	280	1	...	...
Other countries in Europe	2	...	...	...	...	13
North America	...	...	150	...	...	...
Palestine	2	...	17	...	...	...
Poland	250	...	711	...	...	...
Portugal	1	...	...	...	...	...
Russia	898	...	...	...	...	...
Sweden	55	...	...	11	...	...
Switzerland	79	...	...	...	...	...
Syria	4	...	...	...	...	...
Turkey	141	...	25	...	...	...
Union of South Africa	606	6	100	...	5	...
United Kingdom	3,876	2,039	10,061	1,140	20	77
U. S. A.	16,149	1,737	20,459	996	...	701
TOTAL	30,770	5,294	39,224	2,401	219	912

Foreign Imports of Rubber in Long Tons

Singapore Imports from	Dry Rubber	Wet Rubber (Dry Weight)
Banka and Billiton	2	1
Brunei	165	4
Dutch Borneo	1,161	66
French Indo-China	16	88
Java	158	...
North Borneo	767	51
Other Dutch Islands	46	2
Rhio Residency	633	7
Siam	3,722	5
Sarawak	428	79
Sumatra	7,699	5,060
TOTAL	14,797	5,463
Malayan Union Imports from		
Burma	468	18
Dutch Borneo	13	...
Siam	1,526	106
Sumatra	712	1,091
TOTAL	2,719	1,215

Dealers Stocks	Tons
Singapore	47,412
Penang & Province Wellesley	14,744
TOTAL	62,156

Port Stocks in Private Lighters and Railway Godowns	
Penang & Province Wellesley	6,372
Port Dickson	63
Port Swettenham	2,122
Singapore	16,583
Teluk Anson	352
TOTAL	25,492
Production	
Estates	31,636
Small holdings (est.)	27,037
TOTAL	58,673

OBITUARY

Alfred P. Henry

ALFRED P. HENRY, assistant purchasing agent of United States Rubber Co., Rockefeller Center, New York 20, N. Y., died suddenly February 5 of a heart attack in a New York railroad station; he had been suffering from a heart ailment for some time. His home was on Bay Drive, Huntington, L. I.

Mr. Henry had been assistant purchasing agent of the rubber company since April, 1934. He had been first employed by U. S. Rubber almost 31 years ago, starting as assistant to the manager of the stationery department.

Mr. Henry was born in New York, 58 years ago.

He was a Blue Lodge Mason, member of Howard Lodge No. 35, New York.

Surviving are his wife and one brother.

Frank E. Grider

FRANK E. GRIDER, 42, personnel director of the Pharis Tire & Rubber Co., Newark, O., died in Newark Hospital on January 28 of a heart ailment.

Mr. Grider had been associated with Pharis for more than two years, coming to Newark from Cleveland where he had served during the war as chief of the labor division of the War Production Board in the Cleveland area.

He was a native of Cartersville, Ill.

In Newark he was active in the Foremen's Club and was a member of the Methodist Church.

His wife and two daughters survive him.

Arthur E. Barnard

ARTHUR E. BARNARD, inventor's counsellor for United States Rubber Co., Rockefeller Center, New York 20, N. Y., died February 23 of a heart attack at his home in Manhasset, N. Y. Dr. Barnard was associated with the rubber company's research and development activities for 26 years. He was stationed at the company's plant in Naugatuck, Conn., until 1939, when he joined the new products department in New York. In 1944 he became patent and licensing specialist in the Naugatuck Chemical division's New York office. He undertook his most recent duties as inventor's counsellor in the research and development division last November.

Born in Dedham, Mass., 54 years ago, the deceased attended Brown University, where he was graduated in 1915, and from whom he received his Ph.D. in 1918.

He was a member of the American Chemical Society and Sigma Psi.

Surviving are his wife, two sons, and his mother.

Financial

(*Continued from page* 814)

United States Rubber Co., New York, N. Y. For 1947: consolidated net income, $21,753,317, equal, after a dividend of $8 a preferred share, to $9.39 a common share, contrasted with $23,207,941 or $10.23 a share, in 1946; consolidated net sales, $580,968,091 (an all-time peak), against $494,753,028; taxes, $65,349,398, against $62,366,782; total inventories, $121,362,263, against $101,086,716; current assets, $252,141,343, current liabilities, $81,988,939, against the respective figures of $187,151,930 and $08,668,142 on December 31, 1946; net working capital, $70,152,404, against $118,483,788; foreign assets, $43,511,073, against, $35,000,468.

Monsanto Chemical Co., St. Louis, Mo., and subsidiaries, excluding British and Australian subsidiaries. For 1947: net earnings, $15,561,228, equal to $3.59 each on 4,253,019 common shares, compared with $10,084,149 or $3.49 each on 1,267,868 shares, the year before; sales, $143,403,161, a record figure, against $99,590,700.

New Incorporations

Aetna Mfg. Co., Inc., San Francisco, Calif. Capital, $75,000. Principals: R. T. Bostick, Burlingame, L. J. Bloom, San Francisco, and P. A. Kennedy, San Rafael, all in Calif. To manufacture and develop and fabricate rubber and asphalt tile.

Quaker Pacific Rubber Co., San Francisco, Calif. Capital, 5,000 shares of no par value. Directors: F. M. McAuliffe, L. W. Dinkelspiel, and R. E. Guggenhime, all of San Francisco.

Plant Rubber & Asbestos Works, San Francisco, Calif. Capital, 100 shares of no par value. Directors: T. R. Meyers, R. H. Walker, and L. O. Kelso, all of San Francisco.

Sherwin Sales Co., Los Angeles, Calif. Capital, $25,000. Directors: W. J. Sherwin, E. Paulson and E. S. Klauber, all of Los Angeles. To sell at wholesale and retail rubber goods and sundries.

CLASSIFIED ADVERTISEMENTS

Continued

SITUATIONS OPEN (Continued)

WANTED: CHEMIST, PREFERABLY WITH PRODUCTION EXperience on dipped goods, large producer. Excellent opportunity. Address Box No. 55, care of INDIA RUBBER WORLD.

WANTED: MECHANICAL GOODS COMPOUNDER. MODERN rubber plant in northern Ohio. Address Box No. 56, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

Responsible Company willing to purchase company who manufactures imitation leather or spread rubberized fabrics. Give complete information as to products, sales volume, personnel, location of plant, etc. • Replies kept strictly confidential. Address Box No. 67, Care of INDIA RUBBER WORLD.

FIRST-CLASS DUTCH FIRM IN ITALY IS INTERESTED IN new chemicals for rubber and other industries. Address IMMINK & CO., Milan, Via S. Protaso 2, Italy.

RECLAIM FOR SALE:

One carload (approx. 50,000 lbs.) of black reclaim, originally purchased from Tanney-Costello, Inc. Will furnish samples upon request, and will consider best offer for the lot.

MARTIN RUBBER COMPANY, LONG BRANCH, N. J.

Responsible Company willing to purchase small company who manufactures *sponge rubber — moulded items and sheet sponge rubber* — etc. If interested, state location, personnel, sales volume, etc. Replies kept strictly confidential. Address Box No. 69, Care of INDIA RUBBER WORLD.

MACHINERY & SUPPLIES WANTED

CAMACHINE WANTED, SUITABLE FOR SLITTING RUBberized fabric 42", 26 Model 4D preferred. Address Box No. 64, care of INDIA RUBBER WORLD.

FADEOMETER AND SMOOTHING CALENDER 48" TO 60" wide. Address Box No. 65, care of INDIA RUBBER WORLD.

WANTED—MACHINES TO BUILD

36-year-old firm employing 500, devoted exclusively to the building of Machines, Assemblies and Parts for others, would like to get in contact with companies having complete machines or parts to be made to their design. Estimates furnished promptly upon receipt of prints. Write for list of our machine equipment, visit our plant, or ask to see our representative.

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Manufactured by
BROOKLYN COLOR WORKS, Inc.
Morgan and Norman Aves. Brooklyn 22, N. Y.

(Classified Advertisements Continued on Page 818)

CLASSIFIED ADVERTISEMENTS

Continued

MACHINERY & SUPPLIES WANTED (Continued)

RUBBER MILL 36" TO 40", GOOD CONDITION, WITH MOTOR. Give full particulars, price, location. Address Box No. 66, care of INDIA RUBBER WORLD.

WANTED: GOOSENECK PRESS, PLATENS 4' WIDE 8' LONG, complete with clamps and stretcher. Advise location, condition, and price. Address Box No. 72, are of INDIA RUBBER WORLD.

WANTED

Chemicals — Colors — Pigments
Resins — Solvents — Glues — Plasticizers
Other Raw Materials

CHEMICAL SERVICE CORPORATION

80 Beaver Street, New York 5 Hanover 2-6970

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FOR SALE, EITHER ONE OR THE OTHER OF THE FOLlowing groups of equipment, but not both: (1) No. 3 Banbury complete with drive and 75 H.P. motor, in good operating condition and a 48" mill complete with drive and 50 H.P. motor in good operating condition. (2) As an alternative to the above combination, we offer a battery of two 60" mills driven through a Farrel Reduction Gear, including a 150 H.P. motor with controls (or a 300 H.P. motor is available if preferred); and a 3-roll 60" calender complete with drive and 100 H. P. motor. Three hydraulic presses: 48" x 48" with four openings, 24" x 52" with two openings, 24" x 10' 6" with two openings. These are all steam platened presses and are now in service. Address Box No. 61, care of INDIA RUBBER WORLD.

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Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	December, 1947		December, 1946	
UNMANUFACTURED	Quantity	Value	Quantity	Value
Balata ..... lbs.	.....	.....	3,190	$4,092
Crude rubber ..... lbs.	10,791,986	$1,612,735	.....	.....
Latex ..... lbs.	201,058	60,954	86,541	24,725
Rubber, powdered and waste ..... lbs.	95,200	11,537	996,300	29,570
Recovered ..... lbs.	2,400,200	199,156	2,630,800	194,970
Synthetic and substitute ..... lbs.	98,600	32,131	192,800	43,550
TOTALS.	13,587,044	$1,916,513	3,910,631	$296,907
PARTLY MANUFACTURED				
Comb blanks of hard rubber	.....	$ 859	.....	$ .....
Hard rubber in rods or tubes ..... lbs.	269	626	4,818	3,629
Rubber thread, not covered ..... lbs.	6,055	9,230	3,798	4,056
TOTALS.	6,324	$ 10,715	8,616	$ 7,685
MANUFACTURED				
Belting	.....	$ 81,284	.....	$ 57,676
Boots and shoes of rubber, n.o.p. ..... prs.	34,106	55,829	14,584	21,580
Canvas shoes with rubber soles ..... prs.	729	2,317	287	1,006
Cement	.....	49,031	.....	42,246
Clothing of waterproofed cotton or rubber	.....	3,667	.....	5,164
Druggists' sundries	.....	47,690	.....	39,146
Gaskets and washers	.....	33,278	.....	24,980
Gloves ..... doz. prs.	751	2,452	1,562	7,713
Golf balls ..... doz.	877	4,114	.....	.....
Heels ..... prs.	.....	.....	9,504	1, 1[illegible]
Hose	.....	39,126	.....	52,027
Hot water bottles	.....	2,174	.....	3,735
Inner tubes, n.o.p. ..... no.	511	1,311	2,043	15,578
Bicycle ..... no.	6,742	2,779	1,200	801
Liquid sealing compound ..	.....	.....	.....	9,561
Mats and matting	.....	56,543	.....	55,913
Nursing nipples ..... gross	1,594	6,109	1,988	5,024
Packing	.....	15,587	.....	11,515
Raincoats ..... no.	.....	.....	1,138	2,697
Tires pneumatic, n.o.p. . no.	2,729	44,873	3,730	204,671
Bicycle ..... no.	3,935	3,997	1,750	2,569
Solid for automobile and motor trucks no.	94	1,466	16	607
Other	.....	2,176	.....	3,093
Tire repair material	.....	11,371	.....	23,418
Other rubber manufactures	.....	358,733	.....	251,280
TOTALS.	.....	$ 825,907	.....	$ 843,314
TOTAL RUBBER IMPORTS	.....	$2,753,135	.....	$1,147,906

Exports of Crude and Manufactured Rubber

UNMANUFACTURED				
Crude rubber ..... lbs.	4,507,403	$ 807,455	6,368,578	$1,178,250
Waste rubber ..... lbs	799,700	10,487	838,600	9,866
TOTALS.	5,307,103	$ 817,942	7,207,178	$1,188,116
PARTLY MANUFACTURED				
Soling slabs of rubber .. lbs.	.....	.....	13,946	$ 3,195
MANUFACTURED				
Belting, n.o.p. ..... lbs.	388,740	$ 267,663	157,602	$ 109,740
Belts, fan	.....	8,529	.....	4,504
Boots and shoes of rubber, n.o.p ..... prs.	454,417	596,977	173,685	287,110
Canvas shoes with rubber soles ..... prs.	114,594	134,098	217,483	229,103
Clothing of rubber and waterproofed clothing ...	.....	15,948	.....	17,803
Heels	3,564	280	26,701	1,875
Hose	.....	106,701	.....	51,452
Inner tubes for motor vehicles ..... no.	40,346	103,574	24,222	65,605
Soles ..... prs.	2,229	792	63,403	9,337
Tires, pneumatic for motor vehicles .... no.	63,421	1,146 735	24,981	385,736
Other ..... no.	1,313	944	3,392	4,291
Wire and cable, copper, insulated	.....	143,620	.....	99,301
Other rubber manufactures	.....	70,071	.....	49,113
TOTALS.	.....	$2,595,932	.....	$1,314,970
TOTAL RUBBER EXPORTS.	.....	$3,413,874	.....	$2,506,281

"Sharples Synthetic Organic Chemicals." Fifteenth edition. December, 1947. Sharples Chemicals, Inc., 123 S. Broad St., Philadelphia 9, Pa. 68 pages. This catalog gives specifications on physical and chemical properties of the company's products, together with information on containers and major applications. Products covered include esters, ethers, alkyl chlorides, amines, ureas, amides, dithiocarbamates, phenols, mercaptans, hydrocarbons, corrosion inhibiters, and rubber chemicals. Solubility tables and a list of other Sharples publications complete this booklet.

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Continued

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FOR SALE: 1—SET 14 IRON SMOOTH SOLE MOLDS; 1—SET ½" Men's Heel Molds; 1—New long rotor for a #3 Banbury mixer; 20—Heel and sole dies for hand dinking operation; 1—24" x 24" electrically heated heel press complete with new heating elements and controls and specially designed platens. Address Box No. 62, care of INDIA RUBBER WORLD.

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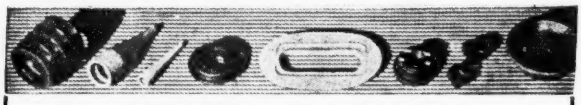

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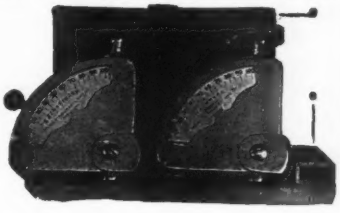

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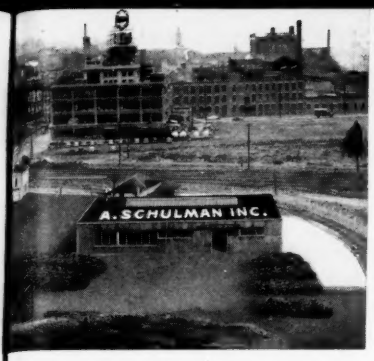

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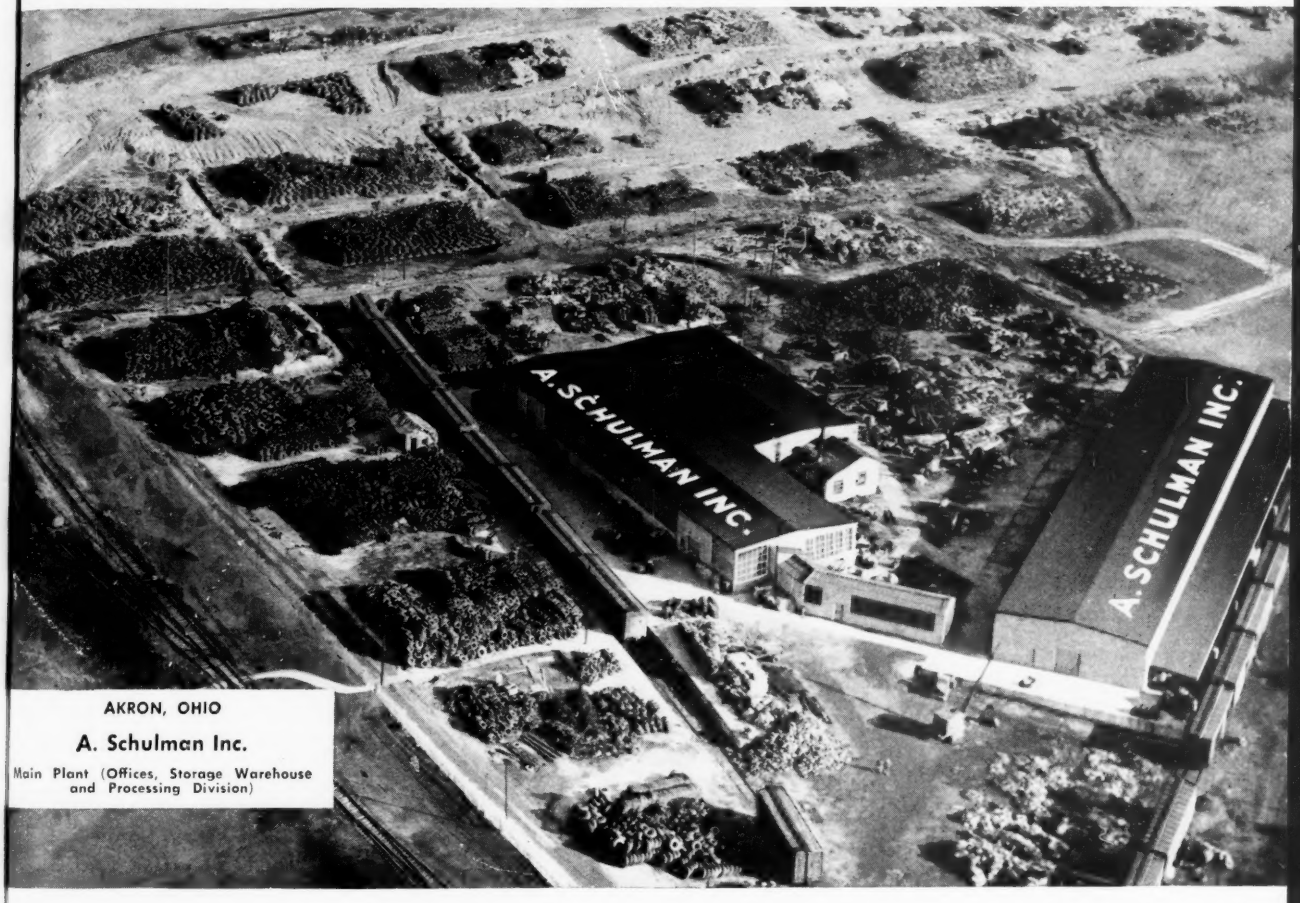

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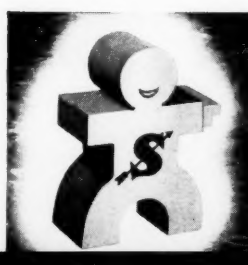

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